(54) Title: INDUCING CELLULAR IMMUNE RESPONSES TO HUMAN PAPILLOMAVIRUS USING PEPTIDE AND NUCLEIC ACID COMPOSITIONS

(57) Abstract: This invention uses our knowledge of the mechanisms by which antigen is recognized by T cells to identify and prepare human papillomavirus (HPV) epitopes, and to develop epitope-based vaccines directed towards HPV. More specifically, this application communicates our discovery of pharmaceutical compositions and methods of use in the prevention and treatment of HPV infection.

5

INDUCING CELLULAR IMMUNE RESPONSES TO HUMAN PAPILLOMAVIRUS USING PEPTIDE AND NUCLEIC ACID COMPOSITIONS

I. BACKGROUND OF THE INVENTION

10   Human papillomavirus (HPV) is a member of the papillomaviridae, a group of small DNA viruses that infect a variety of higher vertebrates. More than 80 types of HPVs have been identified. Of these, more than 30 can infect the genital tract. Some types, generally types 6 and 11, may cause genital warts, which are typically benign and rarely develop into cancer. Other strains of HPV, "cancer-associated", or "high-risk" types, can more frequently lead to the development of cancer. The primary

15   mode of transmission of these strains of HPV is through sexual contact.
        The main manifestations of the genital warts are cauliflower-like condylomata acuminata that usually involve moist surfaces; keratotic and smooth papular warts, usually on dry surfaces; and subclinical "flat" warts, which are found on any mucosal or cutaneous surface (Handsfield, H., *Am. J. Med.* 102(5A):16-20, 1997). These warts are typically benign but are a source of inter-individual spread of the

20   virus (Ponten, J. & Guo, Z., *Cancer Surv.* 32:201-29, 1998). At least three HPV strains associated with genital warts have been identified: type 6a (see, *e.g.*, Hofmann, K.J., *et al., Virology 209(2):506*-518, 1995), type 6b (see, *e.g.*, Hofmann *et al.*, supra) and type 11 (see, *e.g.*, Dartmann, K. *et al., Virology* 151(1):124-130, 1986).
        Cancer-associated HPVs have been linked with cancer in both men and women; they

25   include, but are not limited to, HPV-16, HPV-18, HPV-31, HPV-45, HPV-33 and HPV-56. Other HPV strains, including types 6 and 11 as well as others, *e.g.*, HPV-5 and HPV-8, are less frequently associated with cancer. The high risk types are typically associated with the development of cervical carcinoma and premalignant lesions of the cervix in women, but are also associated with similar malignant and premalignant lesions at other anatomic sites within the lower genital or anogenital tract. These lesions

30   include neoplasia of the vagina, vulva, perineum, the penis, and the anus. HPV infection has also been associated with respiratory tract papillomas, and rarely, cancer, as well as abnormal growth or neoplasia in other epithelial tissues. *See, e.g.* VIROLOGY, 2ᴺᴰ ED, Fields *et al.*, Eds. Raven Press, New York, 1990, Chapters 58 and 59, for a review of HPV association with cancer.
        The HPV genome consists of three functional regions, the early region, the late region,

35   and the "long control region". The early region gene products control viral replication, transcription and cellular transformation They include the HPV E1 and E2 proteins, which play a role in HPV DNA replication, and the E6 and E7 oncoproteins, which are involved in the control of cellular proliferation. The late region include the genes that encode the structural proteins L1 and L2, which are the major and minor capsid proteins, respectively. The "long control region" contains such sequences as enhancer and promoter

40   regulatory regions.

HPV expresses different proteins at different stages of the infection, for example early, as well as late, proteins. Even in latent infections, however, early proteins are often expressed and are therefore useful targets for vaccine-based therapies. For example, high-grade dysplasia and cervical squamous cell carcinoma continue to express E6 and E7, which therefore can be targeted to treat disease at both early and late stages of infection.

Treatment for HPV infection is often unsatisfactory because of persistence of virus after treatment and recurrence of clinically apparent disease is common. The treatment may require frequent visits to clinics and is not directed at elimination of the virus but at clearing warts. Because of persistence of virus after treatment, recurrence of clinically apparent disease is common.

Thus, a need exists for an efficacious vaccine to both prevent and treat HPV infection and to treat cancer that is associated with HPV infection. Effective HPV vaccines would be a significant advance in the control of sexually transmissable infections and could also protect against clinical disease, particularly cancers such as cervical cancer. (*see*, *e.g.*, Rowen, P. & Lacey, C., *Dermatologic Clinics* 16(4):835-838, 1998).

Virus-specific, human leukocyte antigen (HLA) class I-restricted cytotoxic T lymphocytes (CTL) are known to play a major role in the prevention and clearance of virus infections *in vivo* (Oldstone *et al.*, *Nature* 321:239, 1989; Jamieson *et al.*, *J. Virol.* 61:3930, 1987; Yap *et al*, *Nature* 273:238, 1978; Lukacher *et al.*, *J. Exp. Med.* 160:814, 1994; McMichael *et al.*, *N. Engl. J. Med.* 309:13, 1983; Sethi *et al.*, *J. Gen. Virol.* 64:443, 1983; Watari *et al.*, *J. Exp. Med.* 165:459, 1987; Yasukawa *et al.*, *J. Immunol.* 143:2051, 1989; Tigges *et al.*, *J. Virol.* 66:1622, 1993; Reddenhase *et al.*, *J. Virol.* 55:263, 1985; Quinnan *et al.*, *N. Engl. J. Med.* 307:6, 1982). HLA class I molecules are expressed on the surface of almost all nucleated cells. Following intracellular processing of antigens, epitopes from the antigens are presented as a complex with the HLA class I molecules on the surface of such cells. CTL recognize the peptide-HLA class I complex, which then results in the destruction of the cell bearing the HLA-peptide complex directly by the CTL and/or via the activation of non-destructive mechanisms *e.g.*, the production of interferon, that inhibit viral replication.

Virus-specific T helper lymphocytes are also known to be critical for maintaining effective immunity in chronic viral infections. Historically, HTL responses were viewed as primarily supporting the expansion of specific CTL and B cell populations; however, more recent data indicate that HTL may directly contribute to the control of virus replication. For example, a decline in CD4^{+} T cells and a corresponding loss in HTL function characterize infection with HIV (Lane *et al.*, *New Engl. J. Med.* 313:79, 1985). Furthermore, studies in HIV infected patients have also shown that there is an inverse relationship between virus-specific HTL responses and viral load, suggesting that HTL plays a role in viremia (*see*, *e.g.*, Rosenberg *et al.*, *Science* 278:1447, 1997).

The development of vaccines with prophylactic and therapeutic efficacy against HPV is ongoing. Early vaccine development was hampered by the inability to culture HPV. With the introduction of cloning techniques and protein expression, however, some attempts have been made to stimulate humoral and CTL response to HPV (*See*, *e.g.*, Rowen, P. & Lacey, C., *Dermatologic Clinics* 16(4):835-838 (1998)) Studies to date, however, have been inconclusive.

Activation of T helper cells and cytotoxic lymphocytes (CTLs) in the development of vaccines has also been analyzed. Lehtinen, M., *et al.* for instance, has shown that some peptides from the E2 protein of HPV type 16 activate T helper cells and CTLs (*Biochem. Biophys. Res. Commun.* 209(2):541-6 (1995). Similarly, Tarpey *et al*, has shown that some peptides from HPV type 11 E7 protein can stimulate human HPV-specific CTLs *in vitro* (*Immunology* 81:222-227 (1994)) and Borysiewicz *et al.* have reported a recombinant vaccinia virus expressing HPV 16 and HPV 17 E6 and E7 that stimulated CTL responses in at least one patient (*Lancet* 347:1347-1357, 1996).

The epitope approach, as we have described, allows the incorporation of various antibody, CTL and HTL epitopes, from various proteins, in a single vaccine composition. Such a composition may simultaneously target multiple dominant and subdominant epitopes and thereby be used to achieve effective immunization in a diverse population.

The information provided in this section is intended to disclose the presently understood state of the art as of the filing date of the present application. Information is included in this section which was generated subsequent to the priority date of this application. Accordingly, information in this section is not intended, in any way, to delineate the priority date for the invention.

II. SUMMARY OF THE INVENTION

This invention applies our knowledge of the mechanisms by which antigen is recognized by T cells, for example, to develop epitope-based vaccines directed towards HPV. More specifically, this application communicates our discovery of specific epitope pharmaceutical compositions and methods of use in the prevention and treatment of HPV infection.

Upon development of appropriate technology, the use of epitope-based vaccines has several advantages over current vaccines, particularly when compared to the use of whole antigens in vaccine compositions. There is evidence that the immune response to whole antigens is directed largely toward variable regions of the antigen, allowing for immune escape due to mutations. The epitopes for inclusion in an epitope-based vaccine may be selected from conserved regions of viral or tumor-associated antigens, which thereby reduces the likelihood of escape mutants. Furthermore, immunosuppressive epitopes that may be present in whole antigens can be avoided with the use of epitope-based vaccines.

An additional advantage of an epitope-based vaccine approach is the ability to combine selected epitopes (CTL and HTL), and further, to modify the composition of the epitopes, achieving, for example, enhanced immunogenicity. Accordingly, the immune response can be modulated, as appropriate, for the target disease. Similar engineering of the response is not possible with traditional approaches.

Another major benefit of epitope-based immune-stimulating vaccines is their safety. The possible pathological side effects caused by infectious agents or whole protein antigens, which might have their own intrinsic biological activity, is eliminated.

An epitope-based vaccine also provides the ability to direct and focus an immune response to multiple selected antigens from the same pathogen. Thus, patient-by-patient variability in the immune response to a particular pathogen may be alleviated by inclusion of epitopes from multiple antigens from the pathogen in a vaccine composition. In the case of HPV, epitopes derived from multiple strains may also be included. A "pathogen" may be an infectious agent or a tumor associated molecule.

One of the most formidable obstacles to the development of broadly efficacious epitope-based immunotherapeutics, however, has been the extreme polymorphism of HLA molecules. To date, effective non-genetically biased coverage of a population has been a task of considerable complexity; such coverage has required that epitopes be used that are specific for HLA molecules corresponding to each

5 individual HLA allele. Impractically large numbers of epitopes would therefore have to be used in order to cover ethnically diverse populations. Thus, there has existed a need for peptide epitopes that are bound by multiple HLA antigen molecules for use in epitope-based vaccines. The greater the number of HLA antigen molecules bound, the greater the breadth of population coverage by the vaccine.

Furthermore, as described herein in greater detail, a need has existed to modulate peptide

10 binding properties, *e.g.*, so that peptides that are able to bind to multiple HLA antigens do so with an affinity that will stimulate an immune response. Identification of epitopes restricted by more than one HLA allele at an affinity that correlates with immunogenicity is important to provide thorough population coverage, and to allow the elicitation of responses of sufficient vigor to prevent or clear an infection in a diverse segment of the population. Such a response can also target a broad array of epitopes. The

15 technology disclosed herein provides for such favored immune responses.

In a preferred embodiment, epitopes for inclusion in vaccine compositions of the invention are selected by a process whereby protein sequences of known antigens are evaluated for the presence of motif or supermotif-bearing epitopes. Peptides corresponding to a motif- or supermotif-bearing epitope are then synthesized and tested for the ability to bind to the HLA molecule that recognizes the

20 selected motif. Those peptides that bind at an intermediate or high affinity *i.e.*, an IC_{50} (or a K_D value) of 500 nM or less for HLA class I molecules or an IC_{50} of 1000 nM or less for HLA class II molecules, are further evaluated for their ability to induce a CTL or HTL response. Immunogenic peptide epitopes are selected for inclusion in vaccine compositions.

Supermotif-bearing peptides may additionally be tested for the ability to bind to multiple

25 alleles within the HLA supertype family. Moreover, peptide epitopes may be analogued to modify binding affinity and/or the ability to bind to multiple alleles within an HLA supertype.

The invention also includes embodiments comprising methods for monitoring or evaluating an immune response to HPV in a patient having a known HLA-type. Such methods comprise incubating a T lymphocyte sample from the patient with a peptide composition comprising an HPV epitope

30 that has an amino acid sequence described in Tables VII to Table XX which binds the product of at least one HLA allele present in the patient, and detecting for the presence of a T lymphocyte that binds to the peptide. A CTL peptide epitope may, for example, be used as a component of a tetrameric complex for this type of analysis.

An alternative modality for defining the peptide epitopes in accordance with the invention

35 is to recite the physical properties, such as length; primary structure; or charge, which are correlated with binding to a particular allele-specific HLA molecule or group of allele-specific HLA molecules. A further modality for defining peptide epitopes is to recite the physical properties of an HLA binding pocket, or properties shared by several allele-specific HLA binding pockets (*e.g.* pocket configuration and charge distribution) and reciting that the peptide epitope fits and binds to the pocket or pockets.

As will be apparent from the discussion below, other methods and embodiments are also contemplated. Further, novel synthetic peptides produced by any of the methods described herein are also part of the invention.

III. DETAILED DESCRIPTION OF THE INVENTION

The peptides and corresponding nucleic acid compositions of the present invention are useful for stimulating an immune response to HPV by stimulating the production of CTL or HTL responses. The peptide epitopes, which are derived directly or indirectly from native HPV protein amino acid sequences, are able to bind to HLA molecules and stimulate an immune response to HPV. The complete sequence of the HPV proteins to be analyzed can be obtained from Genbank. Epitopes and analogs thereof can also be readily determined from sequence information that may subsequently be discovered for heretofore unknown variants of HPV, as will be clear from the disclosure provided below.

The epitopes of the invention have been identified in a number of ways, as will be discussed below. Also discussed in greater detail is that analog peptides have been derived and the binding activity for HLA molecules modulated by modifying specific amino acid residues to create peptide analogs exhibiting altered immunogenicity. Further, the present invention provides compositions and combinations of compositions that enable epitope-based vaccines that are capable of interacting with HLA molecules encoded by various genetic alleles to provide broader population coverage than prior vaccines.

III.A.. Definitions

The invention can be better understood with reference to the following definitions, which are listed alphabetically:

A "computer" or "computer system" generally includes: a processor; at least one information storage/retrieval apparatus such as, for example, a hard drive, a disk drive or a tape drive; at least one input apparatus such as, for example, a keyboard, a mouse, a touch screen, or a microphone; and display structure. Additionally, the computer may include a communication channel in communication with a network. Such a computer may include more or less than what is listed above.

A "construct" as used herein generally denotes a composition that does not occur in nature. A construct can be produced by synthetic technologies, *e.g.*, recombinant DNA preparation and expression or chemical synthetic techniques for nucleic or amino acids. A construct can also be produced by the addition or affiliation of one material with another such that the result is not found in nature in that form.

"Cross-reactive binding" indicates that a peptide is bound by more than one HLA molecule; a synonym is degenerate binding.

A "cryptic epitope" elicits a response by immunization with an isolated peptide, but the response is not cross-reactive *in vitro* when intact whole protein which comprises the epitope is used as an antigen.

A "dominant epitope" is an epitope that induces an immune response upon immunization with a whole native antigen (see, *e.g.*, Sercarz, et al., *Annu. Rev. Immunol.* 11:729-766, 1993). Such a response is cross-reactive *in vitro* with an isolated peptide epitope.

With regard to a particular amino acid sequence, an "epitope" is a set of amino acid residues which is involved in recognition by a particular immunoglobulin, or in the context of T cells, those residues necessary for recognition by T cell receptor proteins and/or Major Histocompatibility Complex (MHC) receptors. In an immune system setting, *in vivo* or *in vitro*, an epitope is the collective features of a

5   molecule, such as primary, secondary and tertiary peptide structure, and charge, that together form a site recognized by an immunoglobulin, T cell receptor or HLA molecule. Throughout this disclosure epitope and peptide are often used interchangeably. It is to be appreciated, however, that isolated or purified protein or peptide molecules larger than and comprising an epitope of the invention are still within the bounds of the invention.

10   "Human Leukocyte Antigen" or "HLA" is a human class I or class II Major Histocompatibility Complex (MHC) protein (*see, e.g.,* Stites, *et al.,* IMMUNOLOGY, 8TH ED., Lange Publishing, Los Altos, CA (1994).

        An "HLA supertype or family", as used herein, describes sets of HLA molecules grouped on the basis of shared peptide-binding specificities. HLA class I molecules that share somewhat similar

15   binding affinity for peptides bearing certain amino acid motifs are grouped into HLA supertypes. The terms HLA superfamily, HLA supertype family, HLA family, and HLA xx-like molecules (where xx denotes a particular HLA type), are synonyms.

        Throughout this disclosure, results are expressed in terms of "IC_{50}'s." IC_{50} is the concentration of peptide in a binding assay at which 50% inhibition of binding of a reference peptide is

20   observed. Given the conditions in which the assays are run (*i.e.,* limiting HLA proteins and labeled peptide concentrations), these values approximate K_D values. Assays for determining binding are described in detail, *e.g.,* in PCT publications WO 94/20127 and WO 94/03205. It should be noted that IC_{50} values can change, often dramatically, if the assay conditions are varied, and depending on the particular reagents used (*e.g.,* HLA preparation, *etc.*). For example, excessive concentrations of HLA molecules will increase the

25   apparent measured IC_{50} of a given ligand.

        Alternatively, binding is expressed relative to a reference peptide. Although as a particular assay becomes more, or less, sensitive, the IC_{50}'s of the peptides tested may change somewhat, the binding relative to the reference peptide will not significantly change. For example, in an assay run under conditions such that the IC_{50} of the reference peptide increases 10-fold, the IC_{50} values of the test

30   peptides will also shift approximately 10-fold. Therefore, to avoid ambiguities, the assessment of whether a peptide is a good, intermediate, weak, or negative binder is generally based on its IC_{50}, relative to the IC_{50} of a standard peptide.

        Binding may also be determined using other assay systems including those using: live cells (*e.g.,* Ceppellini *et al., Nature* 339:392, 1989; Christnick *et al., Nature* 352:67, 1991; Busch *et al., Int.*

35   *Immunol.* 2:443, 19990; Hill *et al., J. Immunol.* 147:189, 1991; del Guercio *et al., J. Immunol.* 154:685, 1995), cell free systems using detergent lysates (*e.g.,* Cerundolo *et al., J. Immunol.* 21:2069, 1991), immobilized purified MHC (*e.g.,* Hill *et al., J. Immunol.* 152, 2890, 1994; Marshall *et al., J. Immunol.* 152:4946, 1994), ELISA systems (*e.g.,* Reay *et al., EMBO J.* 11:2829, 1992), surface plasmon resonance (*e.g.,* Khilko *et al., J. Biol. Chem.* 268:15425, 1993); high flux soluble phase assays (Hammer *et al., J. Exp.*

40   *Med.* 180:2353, 1994), and measurement of class I MHC stabilization or assembly (*e.g.,* Ljunggren *et al.,*

Nature 346:476, 1990; Schumacher *et al.*, *Cell* 62:563, 1990; Townsend *et al.*, *Cell* 62:285, 1990; Parker *et al.*, *J. Immunol.* 149:1896, 1992).

As used herein, "high affinity" with respect to HLA class I molecules is defined as binding with an IC_{50}, or K_D value, of 50 nM or less; "intermediate affinity" is binding with an IC_{50} or K_D value of between about 50 and about 500 nM. "High affinity" with respect to binding to HLA class II molecules is defined as binding with an IC_{50} or K_D value of 100 nM or less; "intermediate affinity" is binding with an IC_{50} or K_D value of between about 100 and about 1000 nM.

The terms "identical" or percent "identity," in the context of two or more peptide sequences, refer to two or more sequences or subsequences that are the same or have a specified percentage of amino acid residues that are the same, when compared and aligned for maximum correspondence over a comparison window, as measured using a sequence comparison algorithm or by manual alignment and visual inspection.

An "immunogenic peptide" or "peptide epitope" is a peptide that comprises an allele-specific motif or supermotif such that the peptide will bind an HLA molecule and induce a CTL and/or HTL response. Thus, immunogenic peptides of the invention are capable of binding to an appropriate HLA molecule and thereafter inducing a cytotoxic T cell response, or a helper T cell response, to the antigen from which the immunogenic peptide is derived.

The phrases "isolated" or "biologically pure" refer to material which is substantially or essentially free from components which normally accompany the material as it is found in its native state. Thus, isolated peptides in accordance with the invention preferably do not contain materials normally associated with the peptides in their *in situ* environment.

"Link" or "join" refers to any method known in the art for functionally connecting peptides, including, without limitation, recombinant fusion, covalent bonding, disulfide bonding, ionic bonding, hydrogen bonding, and electrostatic bonding.

"Major Histocompatibility Complex" or "MHC" is a cluster of genes that plays a role in control of the cellular interactions responsible for physiologic immune responses. In humans, the MHC complex is also known as the HLA complex. For a detailed description of the MHC and HLA complexes, *see*, Paul, FUNDAMENTAL IMMUNOLOGY, 3RD ED., Raven Press, New York, 1993.

The term "motif" refers to the pattern of residues in a peptide of defined length, usually a peptide of from about 8 to about 13 amino acids for a class I HLA motif and from about 6 to about 25 amino acids for a class II HLA motif, which is recognized by a particular HLA molecule. Peptide motifs are typically different for each protein encoded by each human HLA allele and differ in the pattern of the primary and secondary anchor residues.

A "negative binding residue" or "deleterious residue" is an amino acid which, if present at certain positions (typically not primary anchor positions) in a peptide epitope, results in decreased binding affinity of the peptide for the peptide's corresponding HLA molecule.

A "non-native" sequence or "construct" refers to a sequence that is not found in nature, *i.e.*, is "non-naturally occurring". Such sequences include, *e.g.*, peptides that are lipidated or otherwise modified, and polyepitopic compositions that contain epitopes that are not contiguous in a native protein sequence.

The term "peptide" is used interchangeably with "oligopeptide" in the present specification to designate a series of residues, typically L-amino acids, connected one to the other, typically by peptide bonds between the α-amino and carboxyl groups of adjacent amino acids. The preferred CTL-inducing peptides of the invention are 13 residues or less in length and usually consist of between about 8 and about 11 residues, preferably 9 or 10 residues. The preferred HTL-inducing oligopeptides are less than about 50 residues in length and usually consist of between about 6 and about 30 residues, more usually between about 12 and 25, and often between about 15 and 20 residues.

It is to be appreciated that protein or peptide molecules that comprise an epitope of the invention as well as additional amino acid(s) are within the bounds of the invention. In certain embodiments, there is a limitation on the length of a peptide of the invention which is not otherwise a construct as defined herein. An embodiment that is length-limited occurs when the protein/peptide comprising an epitope of the invention comprises a region (*i.e.*, a contiguous series of amino acids) having 100% identity with a native sequence. In order to avoid a recited definition of epitope from reading, *e.g.*, on whole natural molecules, the length of any region that has 100% identity with a native peptide sequence is limited. Thus, for a peptide comprising an epitope of the invention and a region with 100% identity with a native peptide sequence (and which is not otherwise a construct), the region with 100% identity to a native sequence generally has a length of: less than or equal to 600 amino acids, often less than or equal to 500 amino acids, often less than or equal to 400 amino acids, often less than or equal to 250 amino acids, often less than or equal to 100 amino acids, often less than or equal to 85 amino acids, often less than or equal to 75 amino acids, often less than or equal to 65 amino acids, and often less than or equal to 50 amino acids. In certain embodiments, an "epitope" of the invention which is not a construct is comprised by a peptide having a region with less than 51 amino acids that has 100% identity to a native peptide sequence, in any increment of (50, 49, 48, 47, 46, 45, 44, 43, 42, 41, 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5) down to 5 amino acids.

Certain peptide or protein sequences longer than 600 amino acids are within the scope of the invention. Such longer sequences are within the scope of the invention so long as they do not comprise any contiguous sequence of more than 600 amino acids that have 100% identity with a native peptide sequence, or if longer than 600 amino acids, they are a construct. For any peptide that has five contiguous residues or less that correspond to a native sequence, there is no limitation on the maximal length of that peptide in order to fall within the scope of the invention. It is presently preferred that a CTL epitope of the invention be less than 600 residues long in any increment down to eight amino acid residues.

"Pharmaceutically acceptable" refers to a non-toxic, inert, and/or physiologically compatible composition.

A "pharmaceutical excipient" comprises a material such as an adjuvant, a carrier, pH-adjusting and buffering agents, tonicity adjusting agents, wetting agents, preservative, and the like.

A "primary anchor residue" is an amino acid at a specific position along a peptide sequence which is understood to provide a contact point between the immunogenic peptide and the HLA molecule. One to three, usually two, primary anchor residues within a peptide of defined length generally defines a "motif" for an immunogenic peptide. These residues are understood to fit in close contact with peptide binding grooves of an HLA molecule, with their side chains buried in specific pockets of the

binding grooves themselves. In one embodiment, for example, the primary anchor residues are located at position 2 (from the amino terminal position) and at the carboxyl terminal position of a 9-residue peptide epitope in accordance with the invention. The primary anchor positions for each motif and supermotif are set forth in Table 1. For example, analog peptides can be created by altering the presence or absence of
5   particular residues in these primary anchor positions. Such analogs are used to modulate the binding affinity of a peptide comprising a particular motif or supermotif.

    "Promiscuous recognition" is where a distinct peptide is recognized by the same T cell clone in the context of various HLA molecules. Promiscuous recognition or binding is synonymous with cross-reactive binding.

10   A "protective immune response" or "therapeutic immune response" refers to a CTL and/or an HTL response to an antigen derived from an infectious agent or a tumor antigen, which prevents or at least partially arrests disease symptoms or progression. The immune response may also include an antibody response which has been facilitated by the stimulation of helper T cells.

    The term "residue" refers to an amino acid or amino acid mimetic incorporated into an
15   oligopeptide by an amide bond or amide bond mimetic.

    A "secondary anchor residue" is an amino acid at a position other than a primary anchor position in a peptide which may influence peptide binding. A secondary anchor residue occurs at a significantly higher frequency amongst bound peptides than would be expected by random distribution of amino acids at one position. The secondary anchor residues are said to occur at "secondary anchor
20   positions." A secondary anchor residue can be identified as a residue which is present at a higher frequency among high or intermediate affinity binding peptides, or a residue otherwise associated with high or intermediate affinity binding. For example, analog peptides can be created by altering the presence or absence of particular residues in these secondary anchor positions. Such analogs are used to finely modulate the binding affinity of a peptide comprising a particular motif or supermotif.

25   A "subdominant epitope" is an epitope which evokes little or no response upon immunization with whole antigens which comprise the epitope, but for which a response can be obtained by immunization with an isolated peptide, and this response (unlike the case of cryptic epitopes) is detected when whole protein is used to recall the response *in vitro* or *in vivo*.

    A "supermotif" is a peptide binding specificity shared by HLA molecules encoded by two
30   or more HLA alleles. Preferably, a supermotif-bearing peptide is recognized with high or intermediate affinity (as defined herein) by two or more HLA antigens.

    "Synthetic peptide" refers to a peptide that is man-made using such methods as chemical synthesis or recombinant DNA technology.

    As used herein, a "vaccine" is a composition that contains one or more peptides of the
35   invention. There are numerous embodiments of vaccines in accordance with the invention, such as by a cocktail of one or more peptides; one or more epitopes of the invention comprised by a polyepitopic peptide; or nucleic acids that encode such peptides or polypeptides, *e.g.*, a minigene that encodes a polyepitopic peptide. The "one or more peptides" can include any whole unit integer from 1-150, *e.g.*, at least 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31,
40   32, 33, 34, 35, 36, 37, 38, 39, 40 , 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125,

130, 135, 140, 145, or 150 or more peptides of the invention. The peptides or polypeptides can optionally be modified, such as by lipidation, addition of targeting or other sequences. HLA class I-binding peptides of the invention can be admixed with, or linked to, HLA class II-binding peptides, to facilitate activation of both cytotoxic T lymphocytes and helper T lymphocytes. Vaccines can also comprise peptide-pulsed

5 antigen presenting cells, e.g., dendritic cells.

The nomenclature used to describe peptide compounds follows the conventional practice wherein the amino group is presented to the left (the N-terminus) and the carboxyl group to the right (the C-terminus) of each amino acid residue. When amino acid residue positions are referred to in a peptide epitope they are numbered in an amino to carboxyl direction with position one being the position closest to

10 the amino terminal end of the epitope, or the peptide or protein of which it may be a part. In the formulae representing selected specific embodiments of the present invention, the amino- and carboxyl-terminal groups, although not specifically shown, are in the form they would assume at physiologic pH values, unless otherwise specified. In the amino acid structure formulae, each residue is generally represented by a standard three letter or single letter designations. The L-form of an amino acid residue is represented by a

15 capital single letter or a capital first letter of a three-letter symbol, and the D-form for those amino acids having D-forms is represented by a lower case single letter or a lower case three letter symbol. Glycine has no asymmetric carbon atom and is simply referred to as "Gly" or G. The amino acid sequences of peptides set forth herein are generally designated using the standard single letter symbol. (A, Alanine; C, Cysteine; D, Aspartic Acid; E, Glutamic Acid; F, Phenylalanine; G, Glycine; H, Histidine; I, Isoleucine; K, Lysine; L,

20 Leucine; M, Methionine; N, Asparagine; P, Proline; Q, Glutamine; R, Arginine; S, Serine; T, Threonine; V, Valine; W, Tryptophan; and Y, Tyrosine.) In addition to these symbols, "B" in the single letter abbreviations used herein designates α-amino butyric acid.

III.B.   Stimulation of CTL and HTL responses

25 The mechanism by which T cells recognize antigens has been delineated during the past ten years. Based on our understanding of the immune system we have developed efficacious peptide epitope vaccine compositions that can induce a therapeutic or prophylactic immune response to HPV in a broad population. For an understanding of the value and efficacy of the claimed compositions, a brief review of immunology-related technology is provided.

30 A complex of an HLA molecule and a peptidic antigen acts as the ligand recognized by HLA-restricted T cells (Buus, S. et al., Cell 47:1071, 1986; Babbitt, B. P. et al., Nature 317:359, 1985; Townsend, A. and Bodmer, H., Annu. Rev. Immunol. 7:601, 1989; Germain, R. N., Annu. Rev. Immunol. 11:403, 1993). Through the study of single amino acid substituted antigen analogs and the sequencing of endogenously bound, naturally processed peptides, critical residues that correspond to motifs required for

35 specific binding to HLA antigen molecules have been identified and are described herein and are set forth in Tables I, II, and III (see also, e.g., Southwood, et al., J. Immunol. 160:3363, 1998; Rammensee, et al., Immunogenetics 41:178, 1995; Rammensee et al., SYFPEITHI, access via web at : http://134.2.96.221/scripts.hlaserver.dll/home.htm; Sette, A. and Sidney, J. Curr. Opin. Immunol. 10:478, 1998; Engelhard, V. H., Curr. Opin. Immunol. 6:13, 1994; Sette, A. and Grey, H. M., Curr. Opin. Immunol.

40 4:79, 1992; Sinigaglia, F. and Hammer, J. Curr. Biol. 6:52, 1994; Ruppert et al., Cell 74:929-937, 1993;

Kondo *et al.*, *J. Immunol.* 155:4307-4312, 1995; Sidney *et al.*, *J. Immunol.* 157:3480-3490, 1996; Sidney *et al.*, *Human Immunol.* 45:79-93, 1996; Sette, A. and Sidney, J. *Immunogenetics 1999 Nov,50(3-4):201-12.* Review).

Furthermore, x-ray crystallographic analysis of HLA-peptide complexes has revealed pockets within the peptide binding cleft of HLA molecules which accommodate, in an allele-specific mode, residues borne by peptide ligands; these residues in turn determine the HLA binding capacity of the peptides in which they are present. (*See, e.g.*, Madden, D.R. *Annu. Rev. Immunol.* 13:587, 1995; Smith, *et al.*, *Immunity* 4:203, 1996; Fremont *et al.*, *Immunity* 8:305, 1998; Stern *et al.*, *Structure* 2:245, 1994; Jones, E.Y. *Curr. Opin. Immunol.* 9:75, 1997; Brown, J. H. *et al.*, *Nature* 364:33, 1993; Guo, H. C. *et al.*, *Proc. Natl. Acad. Sci. USA* 90:8053, 1993; Guo, H. C. *et al.*, *Nature* 360:364, 1992; Silver, M. L. *et al.*, *Nature* 360:367, 1992; Matsumura, M. *et al.*, *Science* 257:927, 1992; Madden *et al.*, *Cell* 70:1035, 1992; Fremont, D. H. *et al.*, *Science* 257:919, 1992; Saper, M. A. , Bjorkman, P. J. and Wiley, D. C., *J. Mol. Biol.* 219:277, 1991.)

Accordingly, the definition of class I and class II allele-specific HLA binding motifs, or class I or class II supermotifs allows identification of regions within a protein that have the potential of binding particular HLA antigen(s).

The present inventors have found that the correlation of binding affinity with immunogenicity, which is disclosed herein, is an important factor to be considered when evaluating candidate peptides. Thus, by a combination of motif searches and HLA-peptide binding assays, candidates for epitope-based vaccines have been identified. After determining their binding affinity, additional confirmatory work can be performed to select, amongst these vaccine candidates, epitopes with preferred characteristics in terms of population coverage, antigenicity, and immunogenicity.

Various strategies can be utilized to evaluate immunogenicity, including:

1) Evaluation of primary T cell cultures from normal individuals (*see, e.g.*, Wentworth, P. A. *et al.*, *Mol. Immunol.* 32:603, 1995; Celis, E. *et al.*, *Proc. Natl. Acad. Sci. USA* 91:2105, 1994; Tsai, V. *et al.*, *J. Immunol.* 158:1796, 1997; Kawashima, I. *et al.*, *Human Immunol.* 59:1, 1998); This procedure involves the stimulation of peripheral blood lymphocytes (PBL) from normal subjects with a test peptide in the presence of antigen presenting cells *in vitro* over a period of several weeks. T cells specific for the peptide become activated during this time and are detected using, *e.g.*, a lymphokine- or ^{51}Cr-release assay involving peptide sensitized target cells.

2) Immunization of HLA transgenic mice (*see, e.g.*, Wentworth, P. A. *et al.*, *J. Immunol.* 26:97, 1996; Wentworth, P. A. *et al.*, *Int. Immunol.* 8:651, 1996; Alexander, J. *et al.*, *J. Immunol.* 159:4753, 1997); In this method, peptides in incomplete Freund's adjuvant are administered subcutaneously to HLA transgenic mice. Several weeks following immunization, splenocytes are removed and cultured *in vitro* in the presence of test peptide for approximately one week. Peptide-specific T cells are detected using, *e.g.*, a ^{51}Cr-release assay involving peptide sensitized target cells and target cells expressing endogenously generated antigen.

3) Demonstration of recall T cell responses from immune individuals who have effectively been vaccinated, recovered from infection, and/or from chronically infected patients (*see, e.g.*, Rehermann, B. *et al.*, *J. Exp. Med.* 181:1047, 1995; Doolan, D. L. *et al.*, *Immunity* 7:97, 1997; Bertoni, R.

et al., J. Clin. Invest. 100:503, 1997; Threlkeld, S. C. *et al., J. Immunol.* 159:1648, 1997; Diepolder, H. M. *et al., J. Virol.* 71:6011, 1997; In applying this strategy, recall responses are detected by culturing PBL from subjects that have been naturally exposed to the antigen, for instance through infection, and thus have generated an immune response "naturally", or from patients who were vaccinated against the infection.

5   PBL from subjects are cultured *in vitro* for 1-2 weeks in the presence of test peptide plus antigen presenting cells (APC) to allow activation of "memory" T cells, as compared to "naive" T cells. At the end of the culture period, T cell activity is detected using assays for T cell activity including ^{51}Cr release involving peptide-sensitized targets, T cell proliferation, or lymphokine release.

The following describes the peptide epitopes and corresponding nucleic acids of the

10   invention.

III.C.   Binding Affinity of Peptide Epitopes for HLA Molecules

As indicated herein, the large degree of HLA polymorphism is an important factor to be

15   taken into account with the epitope-based approach to vaccine development. To address this factor, epitope selection encompassing identification of peptides capable of binding at high or intermediate affinity to multiple HLA molecules is preferably utilized, most preferably these epitopes bind at high or intermediate affinity to two or more allele-specific HLA molecules.

CTL-inducing peptides of interest for vaccine compositions preferably include those that have an IC_{50} or binding affinity value for class I HLA molecules of 500 nM or better (*i.e.*, the value is $\leq$ 500

20   nM). HTL-inducing peptides preferably include those that have an IC_{50} or binding affinity value for class II HLA molecules of 1000 nM or better, (*i.e.*, the value is $\leq$ 1,000 nM). For example, peptide binding is assessed by testing the capacity of a candidate peptide to bind to a purified HLA molecule *in vitro*. Peptides exhibiting high or intermediate affinity are then considered for further analysis. Selected peptides are tested on other members of the supertype family. In preferred embodiments, peptides that exhibit cross-

25   reactive binding are then used in cellular screening analyses or vaccines.

As disclosed herein, higher HLA binding affinity is correlated with greater immunogenicity. Greater immunogenicity can be manifested in several different ways. Immunogenicity corresponds to whether an immune response is elicited at all, and to the vigor of any particular response, as well as to the extent of a population in which a response is elicited. For example, a peptide might elicit an

30   immune response in a diverse array of the population, yet in no instance produce a vigorous response. In accordance with these principles, close to 90% of high binding peptides have been found to be immunogenic, as contrasted with about 50% of the peptides which bind with intermediate affinity. Moreover, higher binding affinity peptides lead to more vigorous immunogenic responses. As a result, less peptide is required to elicit a similar biological effect if a high affinity binding peptide is used. Thus, in

35   preferred embodiments of the invention, high affinity binding epitopes are particularly useful.

The relationship between binding affinity for HLA class I molecules and immunogenicity of discrete peptide epitopes on bound antigens has been determined for the first time in the art by the present inventors. The correlation between binding affinity and immunogenicity was analyzed in two different experimental approaches (*see, e.g.*, Sette, *et al., J. Immunol.* 153:5586-5592, 1994). In the first

40   approach, the immunogenicity of potential epitopes ranging in HLA binding affinity over a 10,000-fold

range was analyzed in HLA-A*0201 transgenic mice. In the second approach, the antigenicity of
approximately 100 different hepatitis B virus (HBV)-derived potential epitopes, all carrying A*0201
binding motifs, was assessed by using PBL from acute hepatitis patients. Pursuant to these approaches, it
was determined that an affinity threshold value of approximately 500 nM (preferably 50 nM or less)
determines the capacity of a peptide epitope to elicit a CTL response. These data are true for class I binding
affinity measurements for naturally processed peptides and for synthesized T cell epitopes. These data also
indicate the important role of determinant selection in the shaping of T cell responses (see, e.g., Schaeffer et
al. Proc. Natl. Acad. Sci. USA 86:4649-4653, 1989).

An affinity threshold associated with immunogenicity in the context of HLA class II DR
molecules has also been delineated (see, e.g., Southwood et al. J. Immunology 160:3363-3373, 1998, and
co-pending U.S.S.N. 09/009,953 filed 1/21/98). In order to define a biologically significant threshold of
DR binding affinity, a database of the binding affinities of 32 DR-restricted epitopes from their restricting
element (i.e., the HLA molecule that binds the motif) was compiled. In approximately half of the cases (15
of 32 epitopes), DR restriction was associated with high binding affinities, i.e. binding affinity values of
100 nM or less. In the other half of the cases (16 of 32), DR restriction was associated with intermediate
affinity (binding affinity values in the 100-1000 nM range). In only one of 32 cases was DR restriction
associated with an IC_{50} of 1000 nM or greater. Thus, 1000 nM can be defined as an affinity threshold
associated with immunogenicity in the context of DR molecules.

In the case of tumor-associated antigens (TAAs), many CTL peptide epitopes that have
been shown to induce CTL that lyse peptide-pulsed target cells and tumor cell targets endogenously
expressing the epitope exhibit binding affinity or IC_{50} values of 200 nM or less. In a study that evaluated
the association of binding affinity and immunogenicity of a small set of such TAA epitopes, 100% (10/10)
of the high binders, i.e., peptide epitopes binding at an affinity of 50 nM or less, were immunogenic and
80% (8/10) of them elicited CTLs that specifically recognized tumor cells. In the 51 to 200 nM range, very
similar figures were obtained. With respect to analog peptides, CTL inductions positive for wildtype
peptide and tumor cells were noted for 86% (6/7) and 71% (5/7) of the peptides, respectively. In the 201-
500 nM range, most peptides (4/5 wildtype) were positive for induction of CTL recognizing wildtype
peptide, but tumor recognition was not detected.

The binding affinity of peptides for HLA molecules can be determined as described in
Example 1, below.

III.D.   Peptide Epitope Binding Motifs and Supermotifs

Through the study of single amino acid substituted antigen analogs and the sequencing of
endogenously bound, naturally processed peptides, critical residues required for allele-specific binding to
HLA molecules have been identified. The presence of these residues correlates with binding affinity for
HLA molecules. The identification of motifs and/or supermotifs that correlate with high and intermediate
affinity binding is an important issue with respect to the identification of immunogenic peptide epitopes for
the inclusion in a vaccine. Kast et al. (J. Immunol. 152:3904-3912, 1994) have shown that motif-bearing
peptides account for 90% of the epitopes that bind to allele-specific HLA class I molecules. In this study all
possible peptides of 9 amino acids in length and overlapping by eight amino acids (240 peptides), which

cover the entire sequence of the E6 and E7 proteins of human papillomavirus type 16, were evaluated for binding to five allele-specific HLA molecules that are expressed at high frequency among different ethnic groups. This unbiased set of peptides allowed an evaluation of the predictive value of HLA class I motifs. From the set of 240 peptides, 22 peptides were identified that bound to an allele-specific HLA molecule

5   with high or intermediate affinity. Of these 22 peptides, 20 (i.e. 91%) were motif-bearing. Thus, this study demonstrates the value of motifs for the identification of peptide epitopes for inclusion in a vaccine: application of motif-based identification techniques will identify about 90% of the potential epitopes in a target antigen protein sequence.

        Such peptide epitopes are identified in the Tables described below.

10   Peptides of the present invention may also comprise epitopes that bind to MHC class II DR molecules. A greater degree of heterogeneity in both size and binding frame position of the motif, relative to the N and C termini of the peptide, exists for class II peptide ligands. This increased heterogeneity of HLA class II peptide ligands is due to the structure of the binding groove of the HLA class II molecule which, unlike its class I counterpart, is open at both ends. Crystallographic analysis of HLA

15   class II DRB*0101-peptide complexes showed that the major energy of binding is contributed by peptide residues complexed with complementary pockets on the DRB*0101 molecules. An important anchor residue engages the deepest hydrophobic pocket (see, e.g., Madden, D.R. Ann. Rev. Immunol. 13:587, 1995) and is referred to as position 1 (P1). P1 may represent the N-terminal residue of a class II binding peptide epitope, but more typically is flanked towards the N-terminus by one or more residues. Other studies have

20   also pointed to an important role for the peptide residue in the 6th position towards the C-terminus, relative to P1, for binding to various DR molecules.

        In the past few years evidence has accumulated to demonstrate that a large fraction of HLA class I and class II molecules can be classified into a relatively few supertypes, each characterized by largely overlapping peptide binding repertoires, and consensus structures of the main peptide binding

25   pockets. Thus, peptides of the present invention are identified by any one of several HLA-specific amino acid motifs (see, e.g., Tables I-III), or if the presence of the motif corresponds to the ability to bind several allele-specific HLA antigens, a supermotif. The HLA molecules that bind to peptides that possess a particular amino acid supermotif are collectively referred to as an HLA "supertype."

        The peptide motifs and supermotifs described below, and summarized in Tables I-III,

30   provide guidance for the identification and use of peptide epitopes in accordance with the invention.

        Examples of peptide epitopes bearing a respective supermotif or motif are included in Tables as designated in the description of each motif or supermotif below. The Tables include a binding affinity ratio listing for some of the peptide epitopes. The ratio may be converted to IC_{50} by using the following formula: IC_{50} of the standard peptide/ratio = IC_{50} of the test peptide (i.e., the peptide epitope).

35   The IC_{50} values of standard peptides used to determine binding affinities for Class I peptides are shown in Table IV. The IC_{50} values of standard peptides used to determine binding affinities for Class II peptides are shown in Table V. For example, where an HLA-A2.1 motif-bearing peptide shows a relative binding ratio of 0.01 for HLA-A*0201, the IC_{50} value is 500 nM, and where an HLA-A2.1 motif-bearing peptide shows a relative binding ratio of 0.1 for HLA-A*0201, the IC_{50} value is 50 nM.

14

The peptides used as standards for the binding assays described herein are examples of standards; alternative standard peptides can also be used when performing binding studies.

To obtain the peptide epitope sequences listed in Tables VII-XX, protein sequence data for HPV types 6a, 6b, 11a, 16, 18, 31, 33, 45, and 56 were evaluated for the presence of the designated

5   supermotif or motif. Seven HPV structural and regulatory proteins, E1, E2, E5, E6, E7, L1 and L2 were included in the analysis. E4 was also included in the evaluation of some of the strains. Peptide epitopes can additionally be evaluated on the basis of their conservancy (*i.e.*, the amount of variance) among the available protein sequences for each HPV antigen.

In the Tables, motif- and/or supermotif-bearing amino acids sequences identified in the

10 indicated HPV strains are designated by position number and length of the epitope with reference to the HPV sequences and numbering provided below. For each sequence, the four columns provide the following information: column 1 indicates the HPV strain; column 2 indicates the HPV protein in which the motif-bearing sequence is found, *e.g.*, E1, E2, E4, E5, E6, E7, L1, or L2; column 3 indicates the length of the epitope, or in the case of HLA Class II epitopes, the length of the core sequence; and column 4

15 designates the amino acid position in the HPV protein sequence that corresponds to the first amino acid residue of the epitope. For those sections of the Tables that include only three columns, corresponding to columns 2, 3, and 4, the HPV strain is indicated in the heading at the top of the page. For example, the first peptide epitope listed in Table VII, *i.e.*, the HLA-A1 supermotif, for HPV 16, protein E1 is a sequence of 10 residues in length starting at position 206. Accordingly, the amino acid sequence of the epitope is

20 AMLAKFKELY.

For HPV strain 11, the number and position listed for protein E5 refers to either the HPV11 E5a or HPV11 E5b sequence set out below. Because the epitope must include the designated motif or supermotif, *e.g.*, HLA-A2, it can readily be determined whether the sequence refers to HPV11 E5a or E5b by checking the amino acid sequences of both E5a and E5b and selecting the sequence that conforms to

25 the motif listed in Table I.

HPV STRAINS AND AMINO ACID SEQUENCES OF HPV PROTEINS

HPV6A E1

```
1 MADDSGTENEGSGCTGWFMVEAIVQHPTGTQISDDEEVEDSGYDMVDFIDDSNITHNS    60
```
30
```
  LEAQALFNRQEADTHYATVQDLKRKYLGSPYVSPINTIAEAVESEISPRLDAIKLTRQPK   120
```
```
  KVKRRLFQTRELTDSGYGYSEVEAGTGTQVEKHGVPENGGDGQEKDTGRDIEGEEHTEAE   180
```
```
  APTNSVREHAGTAGILELLKCKDLRAALLGKFKECFGLSFIDLIRPFKSDKTTCADWVVA   240
```
```
  GFGIHHSISEAFQKLIEPLSLYAHIQWLTNAWGMVLLVLVRFKVNKSRSTVARTLATLLN   300
```
```
  IPDNQMLIEPPKIQSGVAALYWFRTGISNASTVIGEAPEWITRQTVIEHGLADSQFKLTE   360
```
35
```
  MVQWAYDNDICEESEIAFEYAQRGDFDSNARAFLNSNMQAKYVKDCATMCRHYKHAEMRK   420
```
```
  MSIKQWIKHRGSKIEGTGNWKPIVQFLRHQNIEFIPFLSKFKLWLHGTPKKNCIAIVGPP   480
```
```
  DTGKSYFCMSLISFLGGTVISHVNSSSHFWLQPLVDAKVALLDDATQPCWIYMDTYMRNL   540
```
```
  LDGNPMSIDRKHKALTLIKCPPLLVTSNIDITKEEKYKYLHTRVTTFTFPNPFFDRNGN   600
```
```
  AVYELSNANWKCFFERLSSSLDIQDSEDEEDGSNSQAFRCVPGTVVRTL   649
```
40

HPV6A_E2

```
1  MEAIAKRLDACQEQLLELYEENSTDLNKHVLHWKCMRHESVLLYKAKQMGLSHIGMQVVP    60
   PLKVSEAKGHNAIEMQMHLESLLKTEYSMEPWTLQETSYEMWQTPPKRCFKKRGKTVVFK   120
   FDGCANNTMDYVVWTDVYVQDTDSWVKVHSMVDAKGIYYTCGQFKTYYVNFVKEAEKYGS   180
   TKQWEVCYGSTVICSPASVSSTTQEVSIPESTTYTPAQTSTPVSSSTQEDAVQTPPRKRA   240
   RGVQQSPCNALCVAHIGPVDSGNHNLITNNHDQHQRRNNSNSSATPIVQFQGESNCLKCF   300
   RYRLNDKHRHLFDLISSTWHWASPKAPHKHAIVTVTYHSEEQRQQFLNVVKIPPTIRHKL   360
   GFMSLHLL   368
```

HPV6A_E4

```
1  MAAQLYVLLHLYLALHKKYPFLNLLHTPPHRPPPLCPQAPRKTQCKRRLENEHEESNSHL    60
   ATPCVWPTLDPWTVETTTSSLTITTSTKEGTTVTVQLRL   99
```

HPV6A_E5

```
1  MEVVPVQIAAGTTSTLILPVIIAFVVCFVSIILIVWISDFIVYTSVLVLTLLLYLLLWLL    60
   LTTPLQFFLLTLLVCYCPALYIHHYIVNTQQ   91
```

HPV6A_E6

```
1  MESANASTSATTIDQLCKTFNLSMHTLQINCVFCKNALTTAEIYSYAYKQLKVLFRGGYP    60
   YAACACCLEFHGKINQYRHFDYAGYATTVEEETKQDILDVLIRCYLCHKPLCEVEKVKHI   120
   LTKARFIKLNCTWKGRCLHCWTTCMEDMLP   150
```

HPV6A_E7

```
1  MHGRHVTLKDIVLDLQPPDPVGLHCYEQLVDSSEDEVDVDGQDSQPLKQHFQIVTCCCG    60
   CDSNVRLVVQCTETDIREVQQLLLGTLDIVCPICAPKT   98
```

HPV6A_L1

```
1  MWRPSDSTVYVPPPNPVSKVVATDAYVTRTNIFYHASSSRLLAVGHPYFSIKRANKTVVP    60
   KVSGYQYRVFKVVLPDPNKFALPDSSLFDPTTQRLVWACTGLEVGRGQPLGVGVSGHPFL   120
   NKYDDVENSGSGGNPGQDNRVNVGMDYKQTQLCMVGCAPPLGEHWGKGKQCTNTPVQAGD   180
   CPPLELITSVIQDGDMVDTGFGAMNFADLQTNKSDVPIDICGTTCKYPDYLQMAADPYGD   240
   RLFFFLRKEQMFARHFFNRAGEVGEPVPDTLIIKGSGNRTSVGGSSIYVNTPSGSLVSSEA   300
   QLFNKPYWLQKAQGHNNGICWGNQLFVTVVDTTRSTNMTLCASVTTSSTYTNSDYKEYMR   360
   HVEEYDLQFIFQLCSITLSAEVMAYIHTMNPSVLEDWNFGLSPPPNGTLEDTYRYVQSQA   420
   ITCQKPTPEKEKPDPYKNLSFWEVNLKEKFSSELDQYPLGRKFLLQSGYRGRSSIRTGVK   480
   RPAVSKASAAPKRKRAKTKR   500
```

HPV6A_L2

```
1  MAHSRARRRKRASATQLYQTCKLTGTCPPDVIPKVEHNTIADQILKWGSLGVFFGGLGIG    60
   TGSGTGGRTGYVPLGTSAKPSITSGPMARPPVVVEPVAPSDPSIVSLIEESAIINAGAPE   120
   IVPPAHGGFTITSSETTTPAILDVSVTSHTTTSIFRNPVFTEPSVTQPQPPVEANGHILI   180
```

```
    SAPTITSHPIEEIPLDTFVISSSDSGPTSSTPVPGTAPRPRVGLYSRALHQVQVTDPAFL   240
    STPQRLLTYDNPVYEGEDVSVQFSHDSIHNAPDEAFMDIIRLHRPAIASRRGLVRYSRIG   300
    QRGSMHTRSGKHIGARIHYFYDISPIAQAAEEIEMHPLVAAQDDTFDIYAESFEPDINPT   360
    QHPVTNISDTYLTSTPNTVTQPWGNTTVPLSSIPNDLFLQSGPDITFPTAPMGTPFSPVT   420
    ALPTGPVFITGSGFYLHPAWYFARKRRKRIPLFFSDVAA   459
```
5

```
    HPV6B E1
1   MADDSGTENEGGSGCTGWFMVEAIVQHPTGTQISDDEDEEVEDSGYDMVDFIDDSNITHNS   60
    LEAQALFNRQEADTHYATVQDLKRKYLGSPYVSPINTIAEAVESEISPRLDAIKLTRQPK   120
10  KVKVRRLFQTRELTDSGYGYSEVEAGTGTQVEKHGVPENGGDGQEKDTGRDIEGEEHTEAE   180
    APTNSVREHAGTAGILELLKCKDLRAALLGKFKECFGLSFIDLIRPFKSDKTTCLDWVVA   240
    GFGIHHSISEAFQKLIEPLSLYAHIQWLTNAWGMVLLVLLRFKVNKSRSTVARTLATLLN   300
    IPENQMLIEPPKIQSGVAALYWFRTGISNASTVIGEAPEWITRQTVIEHGLADSQFKLTE   360
    MVQWAYDNDICEESEIAFEYAQRGDFDSNARAFLNSNMQAKYVKDCATMCRHYKHAEMRK   420
15  MSIKQWIKHRGSKIEGTGNWKPIVQFLRHQNIEBFIPFLTKFKLWLHGTPKKNCIAIVGPP   480
    DTGKSYFCMSLISFLGGTVISHVNSSSHFWLQPLVDAKVALLDDATQPCWIYMDTYMRNL   540
    LDGNPMSIDRKHKALTLIKCPPLLVTSNIDITKEDKYKYLHTRVTTFTFPNPFPFDRNGN   600
    AVYELSNTNWKCFFERLSSSLDIQDSEDEEDGSNSQAFRCVPGTVVRTL   649
```
20

```
    HPV6B E2
1   MEAIAKRLDACQEQLLELYEENSTDLHKHVLHWKCMRHESVLLYKAKQMGLSHIGMQVVP   60
    PLKVSEAKGHNAIEMQMHLESLLRTEYSMEPWTLQETSYEMWQTPPKRCFKKRGKTVEVK   120
    FDGCANNTMDYVVWTDVYVQDNDTWVKVHSMVDAKGIYYTCGQFKTYYVNFVKEAEKYGS   180
    TKHWEVCYGSTVICSPASVSSTTQEVSIPESTTYTPAQTSTLVSSSTKEDAVQTPPRKRA   240
25  RGVQQSPCNALCVAHIGPVDSGNHNLITNNHDQHQRRNNSNSSATPIVQFQGESNCLKCF   300
    RYRLNDRHRHLFDLISSTWHWASSKAPHKHAIVTVTYDSEEQRQQFLDVVKIPPTISHKL   360
    GFMSLHLL   368
```

```
    HPV6B E4
30  1   MGAPNIGKYVMAAQLYVLLHLYLALHKKYPFLNLLHTPPHRPPPLCPQAPRKTQCKRRLG   60
    NEHEESNSPLATPCVWPTLDPWTVETTTSSLTITTSTKDGTTVTVQLRL   109
```

```
    HPV6B E5A
1   MEVVPVQIAAGTTSTFILPVIIAFVVCFVSIILIVWISEFIVYTSVLVLTLLLYLLLWLL   60
35  LTTPLQFFLLTLLVCYCPALYIHYYIVTTQQ   91
```

```
    HPV6B E5B
1   MMLTCQFNDGDTWLGLWLLCAFIVGMLGLLLMHYRAVQGDKHTKCKKCNKHNCNDDYVTM   60
    HYTTDGDYIYMN   72
```
40

HPV6B E6

1 MESANASTSATTIDQLCKTFNLSMHTLQINCVFCKNALTTAEIYSYAYKHLKVLFRGGYP   60

  YAACACCLEFHGKINQYRHFDYAGYATTVEEETKQDILDVLIRCYLCHKPLCEVEKVKHI   120

  LTKARFIKLNCTWKGRCLHCWTTCMEDMLP   150

HPV6B E7

1 MHGRHVTLKDIVLDLQPPDPVGLHCYEQLVDSSEDEVDEVDGQDSQPLKQHFQIVTCCCG   60

  CDSNVRLVVQCTETDIREVQQLLLGTLNIVCPICAPKT   98

HPV6A L1

1 MWRPSDSTVYVPPPNPVSKVVATDAYVTRTNIFYHASSSRLLAVGHPYFSIKRANKTVVP   60

  KVSGYQYRVFKVVLPDPNKFALPDSSLFDPTTQRLVWACTGLEVGRGQPLGVGVSGHPFL   120

  NKYDDVENSGSGGNPGQDNRVNVGMDYKQTQLCMVGCAPPLGEHWGKGKQCTNTPVQAGD   180

  CPPLELITSVIQDGDMVDTGFGAMNFADLQTNKSDVPIDICGTTCKYPDYLQMAADPYGD   240

  RLFFFLRKEQMFARHFFNRAGEVGEPVPDTLIIKGSGNRTSVGSSIYVNTPSGSLVSSEA   300

  QLFNKPYWLQKAQGHHNGICWGNQLFVTVVDTTRSTNMTLCASVTTSSTYTNSDYKEYMR   360

  HVEEYDLQFIFQLCSITLSAEVMAYIHTMNPSVLEDWNFGLSPPPNGTLEDTYRYVQSQA   420

  ITCQKPTPEKEKPDPYKNLSFWEVNLKEKFSSELDQYPLGRKFLLQSGYRGRSSIRTGVK   480

  RPAVSKASAAPKRKRAKTKR   500

HPV6B L2

1 MAHSRARRRKRASATQLYQTCKLTGTCPPDVIPKVEHNTIADQILKWGSLGVFFGGLGIG   60

  TGSGTGGRTGYVPLQTSAKPSITSGPMARPPVVVEPVAPSDPSIVSLIEESAIINAGAPE   120

  IVPPAHGGFTITSSETTTPAILDVSVTSHTTTSIFRNPVFTEPSVTQPQPPVEANGHILI   180

  SAPTVTSHPIEEIPLDTFVVSSSDSGPTSSTPVPGTAPRPRVGLYSRALHQVQVTDPAFL   240

  STPQRLITYDNPVYEGEDVSVQFSHDSIHNAPDEAFMDIIRLHRPAIASRRGLVRYSRIG   300

  QRGSMHTRSGKHIGARIHYFYDISPIAQAAEEIEMHPLVAAQDDTFDIYAESFEPGINPT   360

  QHPVTNISDTYLTSTPNTVTQPWGNTTVPLSLPNDLFLQSGPDITFPTAPMGTPFSPVTP   420

  ALPTGPVFITGSGFYLHPAWYFARKRRKRIPLFFSDVAA   453

HPV11 E1

1 MADDSGTENEGSGCTGWFMVEAIVEHTTGTQISEDEEEEVEDSGYDMVDFIDDRHITQNS   60

  VEAQALFNRQEADAHYATVQDLKRKYLGSPYVSPISNVANAVESEISPRLDAIKLTTQPK   120

  KVKRRLFETRELTDSGYGYSEVEAATQVEKHGDPENGGDGQERDTGRDIEGEGVEHREAE   180

  AVDDSTREHADTSGILELLKCKDIRSTLHGKFKDCFGLSFVDLIRPFKSDRTTCADWVVA   240

  GFGIHHSIADAFQKLIEPLSLYAHIQWLTNAWGMVLLVLIRFKVNKSRCTVARTLGTLLN   300

  IPENHMLIEPPKIQSGVRALYWFRTGISNASTVIGEAPEWITRQTVIEHSLADSQFKLTE   360

  MVQWAYDNDICEESEIAFEYAQRGDFDSNARAFLNSNMQAKYVKDCAIMCRHYKHAEMKK   420

  MSIKQWIKYRGTKVDSVGNWKPIVQFLRHQNIEFIPFLSKLKLWLHGTPKKNCTAIVGPP   480

  DTGKSCFCMSLIKFLGGTVISYVNSCSHFWLQPLTDAKVALLDDATQPCWTYMDTYMRNL   540

  LDGNPMSIDRKHRALTLIKCPPLLVTSNIDISKEEKYKYLHSRVTTFTFPNPFPFDRNGN   600

AVYELSDANWKCFFERLSSSLDIEDSEDEEDGSNSQAFRCVPGSVVRTL   649

HPV11 E2

1 MEAIAKRLDACQDQLLELYEENSIDIHKHIMHWKCIRLESVLLHKAKQMGLSHIGLQVVP   60

  PLTVSETKGHNAIEMQMHLESLAKTQYGVEPWTLQDTSYEMWLTPPKRCFKKQGNTVEVK   120

  FDGCEDNVMEYVVWTHIYLQDNDSWVKVTSSVDAKGIYYTCGQFKTYYVNFNKEAQKYGS   180

  TNHWEVCYGSTVICSPASVSSTVREVSIAEPTTYTPAQTTAPTVSACTTEDGVSAPPRKR   240

  ARGPSTNNTLCVANIRSVDSTINNIVTDNYNKHQRRNNCHSAATPIVQLQGDSNCLKCFR   300

  YRLNDKYKHLFELASSTWHWASPEAPHKNAIVTLTYSSEEQRQQFLNSVKIPPTIRHKVG   360

  FMSLHLL   367

HPV11 E4

1 MVVPIIGKYVMAAQLYVLLHLYLALYEKYPLLNLLHTPPHRPPPLQCPPAPRKTACRRRL   60

  GSEHVDRPLTTPCVWPTSDPWTVQSTTSSLTITTSTKEGTTVTVQLRL   108

HPV11 E5A

1 MEVVPVQIAAATTTTLILPVVIAFAVCILSIVLIILISDFVVYTSVLVLTLLLYLLLWLL   60

  LTTPLQFFLLTLCVCYFPAFYIHIYIVQTQQ   91

HPV11 E5B

1 MVMLTCHLNDGDTWLFLWLFTAFVVAVLGLLLLHYRAVHGTEKTKCAKCKSNRNTTVDYV   60

  YMSHGDNGDYVYMN   74

HPV11 E6

1 MESKDASTSATSIDQLCKTFNLSLHTLQIQCVFCRNALTTAEIYAYAYKNLKVVWRDNFP   60

  FAACACCLELQGKINQYRHFNYAAYAPTVEEETNEDILKVLIRCYLCHKPLCEIEKLKHI   120

  LGKARFIKLNNQWKGRCLHCWTTCMEDLLP   150

HPV11 E7

1 MHGRLVTLKDIVLDLQPPDPVGLHCYEQLEDSSEDEVDKVDKQDAQPLTQHYQILTCCCG   60

  CDSNVRLVVECTDGDIRQLQDLLLGTLNIVCPICAPKP   98

HPV11 L1

1 MWRPSDSTVYVPPPNPVSKVVATDAYVKRTNIFYHASSSRLLAVGHPYYSIKKVNKTVVP   60

  KVSGQYQYRVFKVVLPDPNKFALPDSSLFDPTTQRLVWACTGLEVGRGQPLGVGVSGHPLL   120

  NKYDDVENSGGYGGNPGQDNRVNVGMDYKQTQLCMVGCAPPLGEHWGKGTQCSNTSVQNG   180

  DCPPLELITSVIQDGDMVDTGFGAMNFADLQTNKSDVPLDICGTVCKYPDYLQMAADPYG   240

  DRLFFYLRKEQMFARHFFNRAGTVGEPVPDDLLVKGGNNRSSVASSIYVHTPSGSLVSSE   300

  AQLFNKPYWLQKAQGHNNGICWGNHLFVTVVDTTRSTNMTLCASVSKSATYTNSDYKEYM   360

  RHVEEFDLQFIFQLCSITLSAEVMAYIHTMNPSVLEDWNFGLSPPPNGTLEDTYRYVQSQ   420

  AITCQKPTPEKEKQDPYKDMSFWEVNLKEKFSSELDQFPLGRKFLLQSGYRGRTSARTGI   480

KRPAVSKPSTAPKRKRTKTKK   501

HPV11 L2

1 MKPRARRRKRASATQLYQTCKATGTCPPDVIPKVEHTTIADQILKWGSLGVFFGGLGIGT   60

GAGSGGRAGYIPLGSSPKPAITGGPAARPPVLVEPVAPSDPSIVSLIEESAIINAGAPEV   120

VPPTQGGFTITSSESTTPAILDVSVTNHTTTSVFQNPLFTEPSVIQPQPPVEASGHILIS   180

APTITSQHVEDIPLDTFVVSSSDSGFTSSTPLPRAFPRPRVGLYSRALQQVQVTDPAFLS   240

TPQRLVTYDNPVYEGEDVSLQFTHESIHNAPDEAFMDIIRLHRPAITSRRGLVRFSRIGQ   300

RGSMYTRSGQHIGARIHYFQDISPVTQAAEEIELHPLVAAENDTFDIYAEPFDPIPDPVQ   360

HSVTQSYLTSTPNTLSQSWGNTTVPLSIPSDWFVQSGPDITFPTASMGTPFSPVTPALPT   420

GPVFITGSDFYLHPTWYFARRRRKRIPLFFTDVAA   455

HPV16 E1

1 MADPAGTNGEEGTGCNGWFYVEAVVEKKTGDAISDDENENDSDTGEDLVDFIVNDNDYLT   60

QAETETAHALFTAQEAKQHRDAVQVLKRKYLVSPLSDISGCVDNNISPRLKAICIEKQSR   120

AAKRRLFESEDSGYGNTEVETQQMLQVEGRHETETPCSQYSGGSGGGCSQYSSGSGGEGV   180

SERHTICQTPLTNILNVLKTSNAKAAMLAKFKELYGVSFSELVRPFKSNKSTCCDWCIAA   240

FGLTPSIADSIKTLLQQYCLYLHIQSLACSWGMVVLLLVRYKCGKNRETIEKLLSKLLCV   300

SPMCMMIEPPKLRSTAAALYWYKTGISNISEVYGDTPEWIQRQTVLQHSFNDCTFELSQM   360

VQWAYDNDIVDDSEIAYKYAQLADTNSNASAFLKSNSQAKIVKDCATMCRHYKRAEKKQM   420

SMSQWIKYRCDRVDDGGDWKQIVMFLRYQGVEFMSFLTALKRFLQGIPKKNCILLYGAAN   480

TGKSLFGMSLMKFLQGSVICFVNSKSHFWLQPLADAKIGMLDDATVPCWNYIDDNLRNAL   540

DGNLVSMDVKHRPLVQLKCPPLLITSNINAGTDSRWPYLHNRLVVFTFPNEFPFDENGNP   600

VYELNDKNWKSFFSRTWSRLSLHEDEDKENDGDSLPTFKCVSGQNTNTL   649

HPV16 E2   Accession number W2WLHS

1 METLCQRLNVCQDKILTHYENDSTDLRDHIDYWKHMRLECAIYYKAREMGFKHINHQVVP   60

TLAVSKNKALQAIELQLTLETIYNSQYSNEKWTLQDVSLEVYLTAPTGCIKKHGYTVEVQ   120

FDGDICNTMHYTNWTHIYICEEASVTVVEGQVDYYGLYYVHEGIRTYFVQFKDDAEKYSK   180

NKVWEVHAGGQVILCPTSVFSSNEVSSPEIIRQHLANHPAATHTKAVALGTEETQTTIQR   240

PRSEPDTGNPCHTTKLLHRDSVDSAPILTAFNSSHKGRINCNSNTTPIVHLKGDANTLKC   300

LRYRFKKHICTLYTAVSSTWHWTGHNVKHKSAIVTLTYDSEWQRDQFLSQVKIPKTITVST   360

GFMSI   365

HPV16 E5   Accession number W5WLHS

1 MTNLDTASTTLLACFLLCFCVLLCVCLLIRPLLLSVSTYTSLIILVLLLWITAASAFRCF   60

IVYIIFVYIPLFLIHTHARFLIT   83

HPV16 E6

1 MHQKRTAMFQDPQERPRKLPQLCTELQTTIHDIILECVYCKQQLLRREVYDFAFRDLCIV   60

YRDGNPYAVCDKCLKFYSKISEYRHYCYSLYGTTLEQQYNKPLCDLLIRCINCQKPLCPE   120

EKQRHLDKKQRFHNIRGRWTGRCMSCCRSSRTRRETQL   158

HPV16 E7

1 MHGDTPTLHEYMLDLQPETTDLYCYEQLNDSSEEEDEIDGPAGQAEPDRAHYNIVTFCCK   60

CDSTLRLCVQSTHVDIRTLEDLLMGTLGIVCPICSQKP   98

HPV16 L1   Accession number AAD33259

1 MQVTFIYILVITCYENDVNVYHIFFQMSLWLPSEATVYLPPVPVSKVVSTDEYVARTNIY   60

YHAGTSRLLAVGHPYFPIKKPNNNKILVPKVSGLQYRVFRIHLPDPNKFGFPDTSFYNPD   120

TQRLVWACVGVEVGRGQPLGVGISGHPLLNKLDDTENASAYAANAGVDNRECISMDYKQT   180

QLCLIGCKPPIGEHWGKGSPCTNVAVNPGDCPPLELINTVIQDGDMVDTGFGAMDFTTLQ   240

ANKSEVPLDICTSICKYPDYIKMVSEPYGDSLFFYLRREQMFVRHLFNRAGAVGENVPDD   300

LYIKGSGSTANLASSNYFPTPSGSMVTSDAQIFNKPYWLQRAQGHNNGICWGNQLFVTVV   360

DTTRSTNMSLCAAISTSETTYKNTNFKEYLRHGEEYDLQFIFQLCKITLTADVMTYIHSM   420

NSTILEDWNFGLQPPPGGTLEDTYRFVTSQAIACQKHTPPAPKEDPLKKYTFWEVNLKEK   480

FSADLDQFPLGRKFLLQAGLKAKPKFTLGKRKATPTTSSTSTTAKRKKRKL   531

HPV16 L2   Accession number AAD33258

1 MRHKRSAKRTKRASATQLYKTCKQAGTCPPDIIPKVEGKTIADQILQYGSMGVFFGGLGI   60

GTGSGTGGRTGYIPLGTRPPTATDTLAPVRPPLTVDPVGPSDPSIVSLVEETSFIDAGAP   120

TSVPSIPPDVSGFSITTSTDTTPAILDINNTVTTVTTHNNPTFTDPSVLQPPTPAETGGH   180

FTLSSSTISTHNYEEIPMDTFIVSTNPNTVTSSTPIPGSRPVARLGLYSRTTQQVKVVDP   240

AFITTPTKLITYDNPAYEGIDVDNTLYFSSNDNSINIAPDPDFLDIVALHRPALTSRRTG   300

IRYSRIGNKQTLRTRSGKSIGAKVHYYYDFSTIDSAEBIELQTITPSTYTTTSHAALPTS   360

INNGLYDIYADDFITDTSTTPVPSVPSTSLSGYIPANTTIPFGGAYNIPLVSGPDIPINI   420

TDQAPSLIPIVPGSPQYTIIADAGDFYLHPSYYMLRKRRKRLPYFFSDVSLAA   473

HPV18 E1

1 MADPEGTDGEGTGCNGWFYVQAIVDKKTGDVISDDEDENATDTGSDMVDFIDTQGTFCEQ   60

AELETAQALFHAQEVHNDAQVLHVLKRKFAGGSTENSPLGERLEVDTELSPRLQEISLNS   120

GQKKAKRRLFTISDSGYGCSEVEATQIQVTTNGEHGGNVCSGGSTEAIDNGGTEGNNSSV   180

DGTSDNSNIENVNPQCTIAQLKDLLKVNNKQGAMLAVFKDTYGLSFTDLVRNFKSDKTTC   240

TDWVTAIFGVNPTIAEGFKTLIQPFILYAHIQCLDCKWGVLILALLRYKCGKSRLTVAKG   300

LSTLLHVPETCMLIQPPKLRSSVAALYWYRTGISNISEVMGDTPEWIQRLTIIQHGIDDS   360

NFDLSEMVQWAFDNELTDESDMAFEYALLADSNSNAAAFLKSNCQAKYLKDCATMCKHYR   420

RAQKRQMNMSQWIRFRCSKIDEGGDWRPIVQFLRYQQIEFITFLGALKSFLKGTPKKNCL   480

VFCGPANTGKSYFGMSFIHFIQGAVISFVNSTSHFWLEPLTDTKVAMLDDATTTCWTYFD   540

TYMRNALDGNPISIDRKHKPLIQLKCPPILLTTNIHPAKDNRWPYLESRITVFEFPNAFP   600

FDKNGNPVYEINDKNWKCFFERTWSRLDLHEEEEDADTEGNPFGTFKLRAGQNHRPL   657

HPV18 E2   Accession number W2WL18

1 MQTPKETLSERLCSCVQDKIIDHYENDSKDIDSQIQYWQLIRWENAIFFAAREHGIQTLNH   60

QVVPAYNISKSKAHKAIELQMALQGLAQSRYKTEDWTLQDTCEELWNTEPTHCFKKGGQT   120

VQVYFDGNKDNCMTYVAWDSVYYMTDAGTWDKTATCVSHRGLYYVKEGYNTFYIEFKSEC   180

EKYGNTGTWEVHFGNNVIDCNDSMCSTSDDTVSATQLVKQLQHTPSPYSSTVSVGTAKTY   240

GQTSAATRPGHCGLAEKQHCGPVNPLLGAATPTGNNKRRKLCSGNTTPIIHLKGDRNSLK   300

CLRYRLRKHSDHYRDISSTWHWTGAGNEKTGILTVTYHSETQRTKFLNTVAIPDSVQILV   360

GYMTM 365

HPV18 E5   Accession number W5WL18

1 MLSLIFLFCFCVCMYVCCHVPLLPSVCMCAYAWVLVFVYIVVITSPATAFTVYVFCFLLP   60

MLLLHIHAILSLQ 73

HPV18 E6

1 MARFEDPTRRPYKLPDLCTELNTSLQDIEITCVYCKTVLELTEVFEFAFKDLFVVYRDSI   60

PHAACHKCIDFYSRIRELRHYSDSVYGDTLEKLTNTGLYNLLIRCLRCQKPLNPAEKLRH   120

LNEKRRFHNIAGHYRGQCHSCCNRARQERLQRRRETQV 158

HPV18 E7

1 MHGPKATLQDIVLHLEPQNEIPVDLLCHEQLSDSEEENDEIDGVNHQHLPARRAEPQRHT   60

MLCMCCKCEARIKLVVESSADDLRAFQQLFLNTLSFVCPWCASQQ 105

HPV18 L1   Accession number CAA28671

1 MCLYTRVLILHYHLLPLYGPLYHPRPLPLHSILVYMVHIIICGHYIILFLRNVNVFPIFL   60

QMALWRPSDNTVYLPPPSVARVVNTDDYVTPTSIFYHAGSSRLLTVGNPYFRVPAGGGNK   120

QDIPKVSAYQYRVFRVQLPDPNKFGLPDTSIYNPETQRLVWACAGVEIGRGQPLGVGLSG   180

HPFYNKLDDTESSHAATSNVSEDVRDNVSVDYKQTQLCILGCAPAIGEHWAKGTACKSRP   240

LSQGDCPPLELKNTVLEDGDMVDTGYGAMDFSTLQLDTKCEVPLDICQSICKYPDYLQMSA   300

DPYGDSMFFCLRREQLFARHFWNRAGTMGDTVPQSLYIKGTGMPASPGSCVYSPSPSGSI   360

VTSDSQLFNKPYWLHKAQGHNNGVCWHNQLFVTVVDTTPSTNLTICASTQSPVPGQYDAT   420

KFKQYSRHVEEYDLQFIFQLCTITLTADVMSYIHSMNSSILEDWNFGVPPPPTTSLVDTY   480

RFVQSVAITCQKDAAPAENKDPYDKLKFWNVDLKEKFSLDLDQYPLGRKFLVQAGLRRKP   540

TIGPRKRSAPSATTSSKPAKRVRVRARK 568

HPV18 L2   Accession number P2WL18

1 MVSHRAARRKRASVTDLYKTCKQSGTCPPDVVPKVEGTTLADKILQWSSLGIFLGGLGIG   60

TGSGTGGRTGYIPLGGRSNTVVDVGPTRPPVVIEPVGPTDPSIVTLIEDSSVVTSGAPRP   120

TFTGTSGFDITSAGTTTPAVLDITPSSTSVSISTTNFTNPAFSDPSIIEVPQTGEVAGNV   180

FVGTPTSGTHGYEEIPLQTFASSGTGEEPISSTPLPTVRRVAGPRLYSRAYQQVSVANPE   240

FLTRPSSLITYDNPAFEPVDTTLTFDPRSDVPDSDFMDIIRLHRPALTSRRGTVRFSRLG   300

QRATMFTRSGTQIGARVHFYHDISPIAPSPEYIELQLPVLSATEDNDLFDIYADDMDPAVP   360

```
VPSRSTTSFAFFKYSPTISSASSYSNVTVPLTSSWDVPVYTGPDITLPSTTSVWPIVSPT  420

APASTQYIGIHGTHYYLWPLYYFIPKKRKRVPYFFADGFVAA   462
```

HPV31 E1   Accession number W1WL31

```
1 MADPAGTDGEGTGCNGWFYVEAVIDRQTGDNISEDENEDSSDTGEDMVDFIDNCNVYNNQ    60

AEAETAQALFHAQEAEEHAEAVQVLKRKYVGSPLSDISSCVDYNISPRLKAICIENNSKT   120

AKRRLFELPDSGYGNTEVETQQMVQVEEQQTTLSCNGSDGTHSERENETPTRNILQVLKT   180

SNGKAAMLGKFKELYGVSFMELIRPFQSNKSTCTDWCVAAFGVTGTVAEGFKTLLQPYCL   240

YCHLQSLACSWGMVMLMLVRFKCAKNRITIEKLLEKLLCISTNCMLIQPPKLRSTAAALY   300

WYRTGMSNISDVYGETPEWIERQTVLQHSFNDTTFDLSQMVQWAYDNDVMDDSEIAYKYA   360

QLADSDSNACAFLKSNSQAKIVKDCGTMCRHYKRAEKRQMSMGQWIKSRCDKVSDEGDWR   420

DIVKFLRYQQIEFVSFLSALKLFLKGVPKKNCILIHGAPNTGKSYFGMSLISFLQGCIIS   480

YANSKSHFWLQPLADAKIGMLDDATTPCWHYIDNYLRNALDGNPVSIDVKHKALMQLKCP   540

PLLITSNINAGKDDRWPYLHSRLVVFTFPNPFPFDKNGNPVYELSDKNWKSFFSRTWCRL   600

NLHEEEDKENDGDSFSTFKCVSGQNIRTL   629
```

HPV31 E2   Accession number W2WL31

```
1 METLSQRLNVCQDKILEHYENDSKRLCDHIDYWKHIRLECVLMYKAREMGIHSINHQVVP    60

ALSVSKAKALQAIELQMMLETLNNTEYKNEDWTMQQTSLELYLTAPTGCLKKHGYTVEVQ   120

FDGDVHNTMHYTNWKFIYLCIDGQCTVVEGQVNCKGIYYVHEGHITYFVNFTEEAKKYGT   180

GKKWEVHAGGQVIVFPESVFSSDEISFAGIVTKLPTANNTTTSNSKTCALGTSEGVRRAT   240

TSTKRPRTEPEHRNTHHPNKLLRGDSVDSVNCGVISAAACTNQTRAVSCPATTPIIHLKG   300

DANILKCLRYRLSKYKQLYEQVSSTWHWTCTDGKHKNAIVTLTYISTSQRDDFLNTVKIP   360

NTVSVSTGYMTI   372
```

HPV31 E5   Accession number W5WL31

```
1 MIELNISTVSIVLCFLLCFCVLLFVCLVIRPLVLSVSVYATLLLLIVILWVIATSPLRCF    60

CIYVVFIYIPLFVIHTHASFLSQQ   84
```

HPV31 E6   Accession number W6WL31

```
1 MFKNPAERPRKLHELSSALEIPYDELRLNCVYCKGQLTETEVLDFAFTDLTIVYRDDTPH    60

GVCTKCLRFYSKVSEFRWYRYSVYGTTLEKLTNKGICDLLIRCITCQRPLCPEEKQRHLD   120

KKKRFHNIGGRWTGRCIACWRRPRTETQV   149
```

HPV31 E7   Accession number W7WL31

```
1 MRGETPTLQDYVLDLQPEATDLHCYEQLPDSSDEEDVIDSPAGQAEPDTSNYNIVTFCCQ    60

CKSTLRLCVQSTQVDIRILQELLMGSFGIVCPNCSTRL   98
```

HPV31 L1   Accession number P1WL31

```
1 MSLWRPSEATVYLPPVPVSKVVSTDEYVTRTNIYYHAGSARLLTVGHPYYSIPKSDNPKK    60

IVVPKVSGLQYRVFRVRLPDPNKFGFPDTSFYNPETQRLVWACVGLEVGRGQPLGVGISG   120
```

```
    HPLLNKFDDTENSNRYAGGPGTDNRECISMDYKQTQLCLLGCKPPIGEHWGKGSPCSNNA   180

    ITPGDCPPLELKNSVIQDGDMVDTGFGAMDFTALQDTKSNVPLDICNSICKYPDYLKMVA   240

    EPYGDTLFFYLRREQMFVRHFFNRSGTVGESVPTDLYIKGSGSTATLANSTYFPTPSGSM   300

    VTSDAQIFNKPYWMQRAQGHNNGICWGNQLFVTVVDTTRSTNMSVCAAIANSDTTFKSSN   360

5   FKEYLRHGEEFDLQFIFQLCKITLSADIMTYIHSMNPAILEDWNFGLTTPPSGSLEDTYR   420

    FVTSQAITCQKTAPQKPKEDPFKDYVFWEVNLKEKFSADLDQFPLGRKFLLQAGYRARPK   480

    FKAGKRSAPSASTTTPAKRKKTKK  504
```

HPV31 L2   Accession number P2WL31

```
1   MRSKRSTKRTKRASATQLYQTCKAAGTCPSDVIPKIEHTTIADQILRYGSMGVFFGGLGI   60

    GSGSGTGGRTGYVPLSTRPSTVSEASIPIRPPVSIDPVGPLDPSIVSLVEESGIVDVGAP   120

    APIPHPPTTSGFDIATTADTTPAILDVTSVSTHENPTFTDPSVLQPPTPAETSGHLLLSS   180

    SSISTHNYEEIPMDTFIVSTNNENITSSTPIPGVRRPARLGLYSKATQQVKVIDPTFLSA   240

    PKQLITYENPAYETVNAEESLYFSNTSHNIAPDPDFLDIIALHRPALTSRRNTVRYSRLG   300

15  NKQTLRTRSGATIGARVHYYYDISSINPAGESIEMQPLGASATTTSTLNDGLYDIYADTD   360

    FTVDTPATHNVSPSTAVQSTSAVSAYVPTNTTVPLSTGFDIPIFSGPDVPIEHAPTQVFP   420

    FPLAPTTPQVSIFVDGGDFYLHPSYYMLKRRRKRVSYFFTDVSVAA  466
```

HPV45 E1   Accession number S36563

```
1   MADPEGTDGEGTGCNGWFFVETIVEKKTGDVISDDEDETATDTGSDMVDFIDTQLSICEQ   60

    AEQETAQALFHAQEVQNDAQVLHLLKRKFAGGSKENSPLGEQLSVDTDLSPRLQEISLNS   120

    GHKKAKRRLFTISDSGYGCSEVEAAETQVTVNTNAENGGSVHSTQSSGGDSSDNAENVDP   180

    HCSITELKELLQASNKKAAMLAVFKDIYGLSFTDLVRNFKSDKTTCTDWVMAIFGVNPTV   240

    AEGFKTLIKPATLYAHIQCLDCKWGVLILALLRYKCGKNRLTVAKGLSTLLHVPETCMLI   300

25  EPPKLRSSVAALYWYRTGISNISEVSGDTPEWIQRLTIIQHGIDDSNFDLSDMVQWAFDN.   360

    DLTDESDMAFQYAQLADCNSNAAAFLKSNCQAKYLKDCAVMCRHYKRAQKRQMNMSQWIK   420

    YRCSKIDEGGDWRPIVQFLRYQGVEFISFLRALKEFLKGTPKKNCILLYGPANTGKSYFG   480

    MSFIHFLQGAIISFVNSNSHFWLEPLADTKVAMLDDATHTCWTYFDNYMRNALDGNPISI   540

    DRKHKPLLQLKCPPILLTSNIDPAKDNKWPYLESRVTVFTFPHAPPFDKNGNPVYEINDK   600

30  NWKCFFERTWSRLDLHEDDEDADTEGIPFGTFKCVTGQNTRPL   643
```

HPV45 E2   Accession number S36564

```
    MKMQTPKESLSERLSALQDKILDHYENDSKDINSQISYWQLIRLENAILFTAREHGITKL   60

    NHQVVPPINISKSKAHKAIELQMALKGLAQSKYNNEEWTLQDTCEELWNTEPSQCFKKGG   120

35  KTVHVYFDGNKDNCMNYVVWDSIYYITETGIWDKTAACVSYWGVYYIKDGDTTYYVQFKS   180

    ECEKYGNSNTWEVQYGGNVIDCNDSMCSTSDTVSATQIVRQLQHASTSTPKTASVGTPK   240

    PHIQTPATKRPRQCGLTEQHHGRVNTHVHNPLLCSSTSNNKRRKVCSGNTTPIIHLKGDK   300

    NSLKCLRYRLRKYADHYSEISSTWHWTGCNKNTGILTVTYNSEVQRNTFLDVVTIPNSVQ   360

    ISVGYMTI  368
```

40

HPV45 E6   Accession number CAB44706

  1 MARFDDPTQRPYKLPDLCTELNTSLQDVSIACVYCKATLERTEVYQFAFKDLFIVYRDCI   60

    AYAACHKCIDFYSRIRELRYYSNSVYGETLEKITNTELYNLLIRCLRCQKPLNPAEKRRH   120

    LKDKRRFHSIAGQYRGQCNTCCDQARQERLRRRRETQV   158

HPV45 E7   Accession number CAB44707

  1 MHGPRATLQEIVLHLEPQNELDPVDLLCYEQLSESEEENDEADGVSHAQLPARRAEPQRH   60

    KILCVCCKCDGRIELTVESSADDLRTLQQLFLSTLSFVCPWCATNQ   106

HPV45 L1   Accession number CAB44705

  1 MAHNIIYGHGIIIFLKNVNVFPIFLQMALWRPSDSTVYLPPPSVARVVNTDDYVSRTSIF   60

    YHAGSSRLLTVGNPYFRVVPSGAGNKQAVPKVSAYQYRVFRVALPDPNKFGLPDSTIYNP   120

    ETQRLVWACVGMEIGRGQPLGIGLSGHPFYNKLDDTESAHAATAVITQDVRDNVSVDYKQ   180

    TQLCILGCVPAIGEHWAKGTLCKPAQLQPGDCPPLELKNTIIEDGDMVDTGYGAMDFSTL   240

    QDTKCEVPLDICQSICKYPDYLQMSADPYGDSMFFCLRREQLFARHFWNRAGVMGDTVPT   300

    DLYIKGTSANMRETPGSCVYSPSPSGSITTSDSQLFNKPYWLHKAQGHNNGICWHNQLFV   360

    TVVDTTRSTNLTLCASTQNPVPNTYDPTKFKHYSRHVEEYDLQFIFQLCTITLTAEVMSY   420

    IHSMNSSILENWNFGVPPPPTTSLVDTYRFVQSVAVTCQKDTTPPEKQDPYDKLKFWTVD   480

    LKEKFSSDLDQYPLGRKFLVQAGLRRRPTIGPRKRPAASTSTASRPAKRVRIRSKK   536

HPV45 L2   Accession number S36565

  1 MVSHRAARRKRASATDLYRTCKQSGTCPPDVINKVEGTTLADKILQWSSLGIFLGGLGIG   60

    TGSGSGGRTGYVPLGGRSNTVVDVGPTRPPVVIEPVGPTDPSIVTLVEDSSVVASGAPVP   120

    TFTGTSGFEITSSGTTTPAVLDITPTVDSVSISSTSFTNPAFSDPSIIEVPQTGEVSGNI   180

    FVGTPTSGSHGYEEIPLQTFASSGSGTEPISSTPLPTVRRVRGPRLYSRANQQVRVSTSQ   240

    FLTHPSSLVTFDNPAYEPLDTTLSFEPTSNVPDSDFMDIIRLHRPALSSRRGTVRFSRLG   300

    QRATMFTRSGKQIGGRVHFYHDISPIAATEEIELQPLISATNDSDLFDVYADFPPPASTT   360

  · PSTIHKSFTYPKYSLTMPSTAASSYSNVTVPLTSAWDVPIYTGPDIILPSHTPMWPSTSP   420

    TNASTTTYIGIHGTQYYLWPWYYYFPKKRKRIPYFFADGFVAA   463

HPV33 E1   Accession number W1WL33

  1 MADPEGTNGAGMGCTGWFEVEAVIERRTGDNISEDEDETADDSGTDLLEFIDDSMENSIQ   60

    ADTEAARALFNIQEGEDDLNAVCALKRKFAACSQSAAEDVVDRAANPCRTSINKNKECTY   120

    RKRKIDELEDSGYGNTEVETQQMVQQVESQNGDTNLNDLLESSGVGDDSEVSCETNVDSCE   180

    NVTLQEISNVLHSSNTKANILYKFKEAYGISFMELVRPFKSDKTSCTDWCITGYGISPSV   240

    AESLKVLIKQHSLYTHLQCLTCDRGIIILLLIRFRCSKNRLTVAKLMSNLLSIPETCMVI   300

    EPPKLRSQTCALYWFRTAMSNISDVQGTTPEWIDRLTVLQHSFNDNIFDLSEMVQWAYDN   360

    ELTDDSDIAYYYAQLADSNSNAAAFLKSNSQAKIVKDCGIMCRHYKKAEKRKMSIGQWIQ   420

    SRCEKTNDGGNWRPIVQLLRYQNIEFTAFLGAFKKFLKGIPKKSCMLICGPANTGKSYFG   480

    MSLIQFLKGCVISCVNSKSHFWLQPLSDAKIGMIDDVTPISWTYIDDYMRNALDGNEISI   540

    DVKHRALVQLKCPPLLLTSNTNAGTDSRWPYLHSRLTVFEFKNPFPPFDENGNPVYAINDE   600

NWKSFFSRTWCKLDLIEEEDKENHGGNISTFKCSAGENTRSLRS   644

HPV33 E2   Accession number W2WL33

1 MEEISARLNAVQEKILDLYEADKTDLPSQIEHWKLIRMECALLYTAKQMGFSHLCHQVVP   60

SLLASKTKAFQVIELQMALETLSKSQYSTSQWTLQQTSLEVWLCEPPKCFKKQGETVTVQ   120

YDNDKKNTMDYTNWGEIYIIEEDTCTMVTGKVDYIGMYYIHNCEKVYFKYFKEDAAKYSK   180

TQMWEVHVGGQVIVCPTSISSNQISTTETADIQTDNDNRPPQAAAKRRRPADTTDTAQPL   240

TKLFCADPALDNRTARTATNCTNKQRTVCSSNVAPIVHLKGESNSLKCLRYRLKPYKELY   300

SSMSSTWHWTSDNKNSKNGIVTVTFVTEQQQQMFLGTVKIPPTVQISTGFMTL   353

HPV33 E5   Accession number W5WL33

1 MIFVFVLCFILFLCLSLLLRPLILSISTYAWLLVLVLLLWVFVGSPLKIFFCYLLFLYLP   60

MMCINFHAQHMTQQE   75

HPV33 E6   Accession number W6WL33

1 MFQDTEEKPRTLHDLCQALETTIHNIELQCVECKKPLQRSEVYDFAFADLTVVYREGNPF   60

GICKLCLRFLSKISEYRHYNYSVYGNTLEQTVKKPLNEILIRCIICQRPLCPQEKKRHVD   120

LNKRFHNISGRWAGRCAACWRSRRRETAL   149

HPV33 E7   Accession number W7WL33

1 MRGHKPTLKEYVLDLYPEPTDLYCYEQLSDSSDEDEGLDRPDGQAQPATADYYIVTCCHT   60

CNTTVRLCVNSTASDLRTIQQLLMGTVNIVCPTCAQQ   97

HPV33 L1   Accession number P1WL33

1 MSVWRPSEATVYLPPVPVSKVVSTDEYVSRTSIYYYAGSSRLLAVGHPYFSIKNPTNAKK   60

LLVPKVSGLQYRVFRVRLPDPNKFGFPDTSFYNPDTQRLVWACVGLEIGRGQPLGVGISG   120

HPLLNKFDDTETGNKYPGQPGADNRECLSMDYKQTQLCLLGCKPPTGEHWGKGVACTNAA   180

PANDCPPLELINTIIEDGDMVDTGFGCMDFKTLQANKSDVPIDICGSTCKYPDYLXMTSE   240

PYGDSLFFFLRREQMFVRHFFNRAGTLGEAVPDDLYIKGSGTTASIQSSAFFPTPSGSMV   300

TSESQLFNKPYWLQRAQGHNNGICWGNQVFVTVVDTTRSTNMTLCTQVTSDSTYKNENFK   360

EYIRHVEEYDLQFVFQLCKVTLTAEVMTYIHAMNPDILEDWQFGLTPPPSASLQDTYRFV   420

TSQAITCQKTVPPKEKEDPLGKYTFWEVDLKEKFSADLDQFPLGRKFLLQAGLKAKPKLK   480

RAAPTSTRTSSAKRKKVKK   499

HPV33 L2   Accession number P2WL33

1 MRHHKRSTRRKRASATQLYQTCKATGTCPPDVIPKVEGSTIADQILKYGSLGVFFGGLGIG   60

TGSGSGGRTGYVPIGTDPPTAAIPLQPIRPPVTVDTVGPLDSSIVSLIEETSFIEAGAPA   120

PSIPTPSGFDVTTSADTTPAIINVSSVGESSIQTISTHLNPTFTEPSVLHPPAPAEASGH   180

FIFSSPTVSTQSYENIPMDTFVVSTDSSNVTSSTPIPGSRPVARLGLYSRNTQQVKVVDP   240

AFLTSPHKLITYDNPAFESFDPEDTLQFQHSDISPAPDPDFLDIIALHRPAITSRRHTVR   300

FSRVGQKATLKTRSGKQIGARIHYYQDLSPIVPLDHTVPNEQYELQPLHDTSTSSYSIND   360

```
        GLYDVYADDVDNVHTPMQHSYSTFATTRTSNVSIPLNTGFDTPVMSGPDIPSPLFPTSSP   420

        FVPISPFFPFDTIVVDGADFVLHPSYFILRRRRKRFPYFFTDVRVAA   467
```

```
        HPV56 E2    Accession number S36581
5     1 MVPCLQVCKAKACSAIEVQIALESLSTTIYNNEEWTLRDTCEELWLTEPKKCFKKEGQHI   60

        EVWFDGSKNNCMQYVAWKYIYYNGDCGWQKVCSGVDYRGIYYVHDGHKTYYTDFEQEAKK   120

        FGCKNIWEVHMENESIYCPDSVSSTCRYNVSPVETVNEYNTHKTTTTTSTSVGNQDAAVS   180

        HRPGKRPRLRESEFDSSRESHAKCVTTHTHISDTDNTDSRSRSINNNNHPGDKTTPVVHL   240

        KGEPNRLKCCRYRFQKYKTLFVDVTSTYHWTSTDNKNYSIITIIYKDETQRNSFLSHVKI   300

10      PVVYRLVWDK   310
```

```
        HPV56 E6    Accession number W6WL56
      1 MEPQFNNPQERPRSLHHLSEVLEIPLIDLRLSCVYCKKELTRAEVYNFACTELKLVYRDD   60

        FPYAVCRVCLLFYSKVRKYRYYDYSVYGATLESITKKQLCDLLIRCYRCQSPLTPEEKQL   120

15      HCDRKRRFHLIAHGWTGSCLGCWRQTSREPRESTV   155
```

```
        HPV56 E7    Accession number S36580
      1 MHGKVPTLQDVVLELTPQTEIDLQCNEQLDSSEDEDEDEVDHLQERPQQARQAKQHTCYL   60

20      IHVPCCECKFVVQLDIQSTKEDLRVVQQLLMGALTVTCPLCASSN   105
```

```
        HPV56 L1    Accession number S38563
      1 MMLPMMYIYRDPPLHYGLCIFLDVGAVNVFPIFLQMATWRPSENKVYLPPTPVSKVVATD   60

        SYVKRTSIFYHAGSSRLLAVGHPYYSVTKDNRTKNIPKVSAYQYRVFRVRLPDPNKFGLP   120

        DTNIYNPDQERLVWACVGLEVGRGQPLGAGLSGHPLFNRLDDTESSNLANNNVIEDSRDN   180

25      ISVDGKQTQLCIVGCTPAMGEHWTKGAVCKSTQVTTGDCPPLALINTPIEDGDMIDTGFG   240

        AMDFKVLQESKAEVPLDIVQSTCKYPDYLKMSADAYGDSMWFYLRREQLFARHYFNRAGK   300

        VGETIPAELYLKGSNGREPPPSSVYVATPSGSMITSEAQLFNKPYWLQRAQGHNNGICWG   360

        NQLFVTVVDTTRSTNMTISTATEQLSKYDARKINQYLRHVEEYELQFVFQLCKITLSAEV   420

        MAYLHNMNANLLEDWNIGLSPPVATSLEDKYRYVRSTAITCQREQPPTEKQDPLAKYKFW   480

30      DVNLQDSFSTDLDQFPLGRKFLMQLGTRSKPAVATSKKRSAPTSTSTPAKRKRR   534
```

```
        HPV56 L2    Accession number S36582
      1 MVAHRATRRKRASATQLYKTCKLSGTCPEDVVNKIEQKTWADKILQWGSLFTYFGGLGIG   60

        TGTGSGGRAGYVPLGSRPSTIVDVTPARPPIVVESVGPTDPSIVTLVEESSVIESGAGIP   120

35      NFTGSGGFEITSSSTTTPAVLDITPTSSTVHVSSTHITNPLFIDPPVIEAPQTGEVSGNI   180

        LISTPTSGIHSYEEIPMQTFAVHGSGTEPISSTPIPGFRRIAAPRLYRKAFQQVKVTDPA   240

        FLDRPATLVSADNPLFEGTDTSLAFSPSGVAPDPDFMNIVALHRPAFTTRRGGVRFSRLG   300

        RKATIQTRRGTQIGARVHYYYDISPIAQAEEIEMQPLLSANNSFDGLYDIYANIDDEAPG   360

        LSSQSVATPSAHLPIKPSTLSFASNTTNVTAPLGNVWETPFYSGPDIVLPTGPSTWPFVP   420

40      QSPYDVTHDVYIQGSSFALWPVYFFRRRRRKRIPYFFADGDVAA   464
```

HLA Class I Motifs Indicative of CTL Inducing Peptide Epitopes:

The primary anchor residues of the HLA class I peptide epitope supermotifs and motifs delineated below are summarized in Table I. The HLA class I motifs set out in Table I(a) are those most particularly relevant to the invention claimed here. Primary and secondary anchor positions are
5   summarized in Table II. Allele-specific HLA molecules that comprise HLA class I supertype families are listed in Table VI. In some cases, peptide epitopes may be listed in both a motif and a supermotif Table. The relationship of a particular motif and respective supermotif is indicated in the description of the individual motifs.

10   **III.D.1. HLA-A1 supermotif**

The HLA-A1 supermotif is characterized by the presence in peptide ligands of a small (T or S) or hydrophobic (L, I, V, or M) primary anchor residue in position 2, and an aromatic (Y, F, or W) primary anchor residue at the C-terminal position of the epitope. The corresponding family of HLA molecules that bind to the A1 supermotif (*i.e.*, the HLA-A1 supertype) is comprised of at least A*0101,
15   A*2601, A*2602, A*2501, and A*3201 (*see, e.g.*, DiBrino, M. *et al.*, *J. Immunol.* 151:5930, 1993; DiBrino, M. *et al.*, *J. Immunol.* 152:620, 1994; Kondo, A. *et al.*, *Immunogenetics* 45:249, 1997). Other allele-specific HLA molecules predicted to be members of the A1 superfamily are shown in Table VI. Peptides binding to each of the individual HLA proteins can be modulated by substitutions at primary and/or secondary anchor positions, preferably choosing respective residues specified for the supermotif.
20   Representative peptide epitopes that comprise the A1 supermotif are set forth in Table VII.

III.D.2. HLA-A2 supermotif

Primary anchor specificities for allele-specific HLA-A2.1 molecules (*see, e.g.*, Falk *et al.*,
25   *Nature* 351:290-296, 1991; Hunt *et al.*, *Science* 255:1261-1263, 1992; Parker *et al.*, *J. Immunol.* 149:3580-3587, 1992; Ruppert *et al.*, *Cell* 74:929-937, 1993) and cross-reactive binding among HLA-A2 and -A28 molecules have been described. (*See, e.g.*, Fruci *et al.*, *Human Immunol.* 38:187-192, 1993; Tanigaki *et al.*, *Human Immunol.* 39:155-162, 1994; Del Guercio *et al.*, *J. Immunol.* 154:685-693, 1995; Kast *et al.*, *J. Immunol.* 152:3904-3912, 1994 for reviews of relevant data.) These primary anchor residues define the
30   HLA-A2 supermotif; which presence in peptide ligands corresponds to the ability to bind several different HLA-A2 and -A28 molecules. The HLA-A2 supermotif comprises peptide ligands with L, I, V, M, A, T, or Q as a primary anchor residue at position 2 and L, I, V, M, A, or T as a primary anchor residue at the C-terminal position of the epitope.

The corresponding family of HLA molecules (*i.e.*, the HLA-A2 supertype that binds these
35   peptides) is comprised of at least: A*0201, A*0202, A*0203, A*0204, A*0205, A*0206, A*0207, A*0209, A*0214, A*6802, and A*6901. Other allele-specific HLA molecules predicted to be members of the A2 superfamily are shown in Table VI. As explained in detail below, binding to each of the individual allele-specific HLA molecules can be modulated by substitutions at the primary anchor and/or secondary anchor positions, preferably choosing respective residues specified for the supermotif.

Representative peptide epitopes that comprise an A2 supermotif are set forth in Table VIII. The motifs comprising the primary anchor residues V, A, T, or Q at position 2 and L, I, V, A, or T at the C-terminal position are those most particularly relevant to the invention claimed herein.

III.D.3. HLA-A3 supermotif

The HLA-A3 supermotif is characterized by the presence in peptide ligands of A, L, I, V, M, S, or, T as a primary anchor at position 2, and a positively charged residue, R or K, at the C-terminal position of the epitope, *e.g.*, in position 9 of 9-mers (*see, e.g.*, Sidney *et al., Hum. Immunol.* 45:79, 1996). Exemplary members of the corresponding family of HLA molecules (the HLA-A3 supertype) that bind the A3 supermotif include at least A*0301, A*1101, A*3101, A*3301, and A*6801. Other allele-specific HLA molecules predicted to be members of the A3 supertype are shown in Table VI. As explained in detail below, peptide binding to each of the individual allele-specific HLA proteins can be modulated by substitutions of amino acids at the primary and/or secondary anchor positions of the peptide, preferably choosing respective residues specified for the supermotif.

Representative peptide epitopes that comprise the A3 supermotif are set forth in Table IX.

III.D.4. HLA-A24 supermotif

The HLA-A24 supermotif is characterized by the presence in peptide ligands of an aromatic (F, W, or Y) or hydrophobic aliphatic (L, I, V, M, or T) residue as a primary anchor in position 2, and Y, F, W, L, I, or M as primary anchor at the C-terminal position of the epitope (*see, e.g.*, Sette and Sidney, *Immunogenetics 1999 Nov;50(3-4):201-12*, Review). The corresponding family of HLA molecules that bind the A24 supermotif (*i.e.*, the A24 supertype) includes at least A*2402, A*3001, and A*2301. Other allele-specific HLA molecules predicted to be members of the A24 supertype are shown in Table VI. Peptide binding to each of the allele-specific HLA molecules can be modulated by substitutions at primary and/or secondary anchor positions, preferably choosing respective residues specified for the supermotif.

Representative peptide epitopes that comprise the A24 supermotif are set forth in Table X.

III.D.5. HLA-B7 supermotif

The HLA-B7 supermotif is characterized by peptides bearing proline in position 2 as a primary anchor, and a hydrophobic or aliphatic amino acid (L, I, V, M, A, F, W, or Y) as the primary anchor at the C-terminal position of the epitope. The corresponding family of HLA molecules that bind the B7 supermotif (*i.e.*, the HLA-B7 supertype) is comprised of at least twenty six HLA-B proteins including: B*0702, B*0703, B*0704, B*0705, B*1508, B*3501, B*3502, B*3503, B*3504, B*3505, B*3506, B*3507, B*3508, B*5101, B*5102, B*5103, B*5104, B*5105, B*5301, B*5401, B*5501, B*5502, B*5601, B*5602, B*6701, and B*7801 (*see, e.g.*, Sidney, *et al., J. Immunol.* 154:247, 1995; Barber, *et al., Curr. Biol.* 5:179, 1995; Hill, *et al., Nature* 360:434, 1992; Rammensee, *et al., Immunogenetics* 41:178, 1995 for reviews of relevant data). Other allele-specific HLA molecules predicted to be members of the B7 supertype are shown in Table VI. As explained in detail below, peptide binding to each of the individual

allele-specific HLA proteins can be modulated by substitutions at the primary and/or secondary anchor positions of the peptide, preferably choosing respective residues specified for the supermotif.

Representative peptide epitopes that comprise the B7 supermotif are set forth in Table XI.

5   III.D.6. HLA-B27 supermotif

The HLA-B27 supermotif is characterized by the presence in peptide ligands of a positively charged (R, H, or K) residue as a primary anchor at position 2, and a hydrophobic (F, Y, L, W, M, I, A, or V) residue as a primary anchor at the C-terminal position of the epitope (*see, e.g.,* Sidney and Sette, *Immunogenetics 1999 Nov;50(3-4):201-12,* Review). Exemplary members of the corresponding

10   family of HLA molecules that bind to the B27 supermotif (*i.e.,* the B27 subtype) include at least B*1401, B*1402, B*1509, B*2702, B*2703, B*2704, B*2705, B*2706, B*3801, B*3901, B*3902, and B*7301. Other allele-specific HLA molecules predicted to be members of the B27 supertype are shown in Table VI. Peptide binding to each of the allele-specific HLA molecules can be modulated by substitutions at primary and/or secondary anchor positions, preferably choosing respective residues specified for the supermotif.

15   Representative peptide epitopes that comprise the B27 supermotif are set forth in Table XII.

III.D.7. HLA-B44 supermotif

The HLA-B44 supermotif is characterized by the presence in peptide ligands of

20   negatively-charged (D or E) residues as a primary anchor in position 2, and hydrophobic residues (F, W, Y, L, I, M, V, or A) as a primary anchor at the C-terminal position of the epitope (*see, e.g.,* Sidney et al., *Immunol. Today* 17:261, 1996). Exemplary members of the corresponding family of HLA molecules that bind to the B44 supermotif (*i.e.,* the B44 subtype) include at least: B*1801, B*1802, B*3701, B*4001, B*4002, B*4006, B*4402, B*4403, and B*4006. Peptide binding to each of the allele-specific HLA

25   molecules can be modulated by substitutions at primary and/or secondary anchor positions; preferably choosing respective residues specified for the supermotif.

III.D.8. HLA-B58 supermotif

The HLA-B58 supermotif is characterized by the presence in peptide ligands of a small

30   aliphatic residue (A, S, or T) as a primary anchor residue at position 2, and an aromatic or hydrophobic residue (F, W, Y, L, I, V, M, or A) as a primary anchor residue at the C-terminal position of the epitope (*see, e.g.,* Sidney and Sette, *Immunogenetics 1999 Nov;50(3-4):201-12,* Review). Exemplary members of the corresponding family of HLA molecules that bind to the B58 supermotif (*i.e.,* the B58 supertype)

35   include at least: B*1516, B*1517, B*5701, B*5702, and B*5801. Other allele-specific HLA molecules predicted to be members of the B58 supertype are shown in Table VI. Peptide binding to each of the allele-specific HLA molecules can be modulated by substitutions at primary and/or secondary anchor positions, preferably choosing respective residues specified for the supermotif.

Representative peptide epitopes that comprise the B58 supermotif are set forth in Table XIII.

40

III.D.9. HLA-B62 supermotif

The HLA-B62 supermotif is characterized by the presence in peptide ligands of the polar aliphatic residue Q or a hydrophobic aliphatic residue (L, V, M, I, or P) as a primary anchor in position 2, and a hydrophobic residue (F, W, Y, M, I, V, L, or A) as a primary anchor at the C-terminal position of the epitope (*see, e.g.*, Sidney and Sette, *Immunogenetics 1999 Nov;50(3-4):201-12*, Review). Exemplary members of the corresponding family of HLA molecules that bind to the B62 supermotif (*i.e.*, the B62 supertype) include at least: B*1501, B*1502, B*1513, and B5201. Other allele-specific HLA molecules predicted to be members of the B62 supertype are shown in Table VI. Peptide binding to each of the allele-specific HLA molecules can be modulated by substitutions at primary and/or secondary positions, preferably choosing respective residues specified for the supermotif.

Representative peptide epitopes that comprise the B62 supermotif are set forth in Table XIV.

III.D.10. HLA-A1 motif

The HLA-A1 motif is characterized by the presence in peptide ligands of T, S, or M as a primary anchor residue at position 2 and the presence of Y as a primary anchor residue at the C-terminal position of the epitope. An alternative allele-specific A1 motif is characterized by a primary anchor residue at position 3 rather than position 2. This motif is characterized by the presence of D, E, A, or S as a primary anchor residue in position 3, and a Y as a primary anchor residue at the C-terminal position of the epitope (*see, e.g.*, DiBrino *et al.*, J. Immunol.; 152:620, 1994; Kondo *et al.*, *Immunogenetics* 45:249, 1997; and Kubo *et al.*, *J. Immunol.* 152:3913, 1994 for reviews of relevant data). Peptide binding to HLA A1 can be modulated by substitutions at primary and/or secondary anchor positions, preferably choosing respective residues specified for the motif.

Representative peptide epitopes that comprise either A1 motif are set forth in Table XV. Those epitopes comprising T, S, or M at position 2 and Y at the C-terminal position are also included in the listing of HLA-A1 supermotif-bearing peptides listed in Table VII, as these residues are a subset of the A1 supermotif primary anchors.

III.D.11. HLA-A*0201 motif

An HLA-A2*0201 motif was determined to be characterized by the presence in peptide ligands of L or M as a primary anchor residue in position 2, and L or V as a primary anchor residue at the C-terminal position of a 9-residue peptide (*see, e.g.*, Falk *et al.*, *Nature* 351:290-296, 1991) and was further found to comprise an I at position 2 and I or A at the C-terminal position of a nine amino acid peptide (*see, e.g.*, Hunt *et al.*, Science 255:1261-1263, March 6, 1992; Parker *et al.*, *J. Immunol.* 149:3580-3587, 1992). The A*0201 allele-specific motif has also been defined by the present inventors to additionally comprise V, A, T, or Q as a primary anchor residue at position 2, and M or T as a primary anchor residue at the C-terminal position of the epitope (*see, e.g.*, Kast *et al.*, *J. Immunol.* 152:3904-3912, 1994). Thus, the HLA-A*0201 motif comprises peptide ligands with L, I, V, M, A, T, or Q as primary anchor residues at position 2 and L, I, V, M, A, or T as a primary anchor residue at the C-terminal position of the epitope. The preferred and tolerated residues that characterize the primary anchor positions of the HLA-A*0201 motif

are identical to the residues describing the A2 supermotif. (For reviews of relevant data, *see, e.g.*, Del

Guercio *et al.*, *J. Immunol.* 154:685-693, 1995; Ruppert *et al.*, *Cell* 74:929-937, 1993; Sidney *et al.*,

Immunol. Today 17:261-266, 1996; Sette and Sidney, *Curr. Opin. in Immunol.* 10:478-482, 1998).

Secondary anchor residues that characterize the A*0201 motif have additionally been defined (*see, e.g.*,

5   Ruppert *et al.*, *Cell* 74:929-937, 1993). These are shown in Table II. Peptide binding to HLA-A*0201

molecules can be modulated by substitutions at primary and/or secondary anchor positions, preferably

choosing respective residues specified for the motif.

Representative peptide epitopes that comprise an A*0201 motif are set forth in Table

VIII. The A*0201 motifs comprising the primary anchor residues V, A, T, or Q at position 2 and L, I, V, A,

10   or T at the C-terminal position are those most particularly relevant to the invention claimed herein.

III.D.12. HLA-A3 motif

The HLA-A3 motif is characterized by the presence of peptide ligands of L, M, V, I, S, A,

T, F, C, G, or D as a primary anchor residue at position 2, and the presence of K, Y, R, H, F, or A as a

15   primary anchor residue at the C-terminal position of the epitope (*see, e.g.*, DiBrino *et al.*, *Proc. Natl. Acad.*

Sci USA 90:1508, 1993; and Kubo *et al.*, *J. Immunol.* 152:3913-3924, 1994). Peptide binding to HLA-A3

can be modulated by substitutions at primary and/or secondary anchor positions, preferably choosing

respective residues specified for the motif.

Representative peptide epitopes that comprise the A3 motif are set forth in Table XVI.

20   Those epitopes that also comprise the A3 supermotif are also listed in Table IX. The A3 supermotif

primary anchor residues comprise a subset of the A3- and A11-allele specific motif primary anchor

residues.

III.D.13. HLA-A11 motif

25   The HLA-A11 motif is characterized by the presence in peptide ligands of V, T, M, L, I,

S, A, G, N, C, D, or F as a primary anchor residue in position 2, and K, R, Y, or H as a primary anchor

residue at the C-terminal position of the epitope (*see, e.g.*, Zhang *et al.*, *Proc. Natl. Acad. Sci USA* 90:2217-

2221, 1993; and Kubo *et al.*, *J. Immunol.* 152:3913-3924, 1994). Peptide binding to HLA-A11 can be

modulated by substitutions at primary and/or secondary anchor positions, preferably choosing respective

30   residues specified for the motif.

Representative peptide epitopes that comprise the A11 motif are set forth in Table XVII;

peptide epitopes comprising the A3 allele-specific motif are also present in this Table because of the

extensive overlap between the A3 and A11 motif primary anchor specificities. Further, those peptide

epitopes that comprise the A3 supermotif are also listed in Table IX.

35

III.D.14. HLA-A24 motif

The HLA-A24 motif is characterized by the presence in peptide ligands of Y, F, W, or M

as a primary anchor residue in position 2, and F, L, I, or W as a primary anchor residue at the C-terminal

position of the epitope (*see, e.g.*, Kondo *et al.*, *J. Immunol.* 155:4307-4312, 1995; and Kubo *et al.*, *J*

40   *Immunol.* 152:3913-3924, 1994). Peptide binding to HLA-A24 molecules can be modulated by

substitutions at primary and/or secondary anchor positions; preferably choosing respective residues specified for the motif.

Representative peptide epitopes that comprise the A24 motif are set forth in Table XVIII. These epitopes are also listed in Table X, which sets forth HLA-A24-supermotif-bearing peptides, as the primary anchor residues characterizing the A24 allele-specific motif comprise a subset of the A24 supermotif primary anchor residues.

Motifs Indicative of Class II HTL Inducing Peptide Epitopes

The primary and secondary anchor residues of the HLA class II peptide epitope supermotifs and motifs delineated below are summarized in Table III.

III.D.15. HLA DR-1-4-7 supermotif

Motifs have also been identified for peptides that bind to three common HLA class II allele-specific HLA molecules: HLA DRB1*0401, DRB1*0101, and DRB1*0701 (see, e.g., the review by Southwood et al. J. Immunology 160:3363-3373,1998). Collectively, the common residues from these motifs delineate the HLA DR-1-4-7 supermotif. Peptides that bind to these DR molecules carry a supermotif characterized by a large aromatic or hydrophobic residue (Y, F, W, L, I, V, or M) as a primary anchor residue in position 1, and a small, non-charged residue (S, T, C, A, P, V, I, L, or M) as a primary anchor residue in position 6 of a 9-mer core region. Allele-specific secondary effects and secondary anchors for each of these HLA types have also been identified (Southwood et al., supra). These are set forth in Table III. Peptide binding to HLA- DRB1*0401, DRB1*0101, and/or DRB1*0701 can be modulated by substitutions at primary and/or secondary anchor positions, preferably choosing respective residues specified for the supermotif.

Representative 9-mer epitopes comprising the DR-1-4-7 supermotif, wherein position 1 of the supermotif is at position 1 of the nine-residue core, are set forth in Table XIX. Exemplary primers of 15 amino acids in length that comprises the nine residue core include the three residues on either side that flank the nine residue core. HTL epitopes that comprise the core sequences can also be of lengths other than 15 amino acids, supra. Accordingly, epitopes of the invention include sequnces that typically comprise the nine residue core plus 1, 2, 3 (as in the exemplary 15-mer), 4, or 5 flanking residues on either side of the nine residue core.

III.D.16. HLA DR3 motifs

Two alternative motifs (i.e., submotifs) characterize peptide epitopes that bind to HLA-DR3 molecules (see, e.g., Geluk et al., J. Immunol. 152:5742, 1994). In the first motif (submotif DR3A) a large, hydrophobic residue (L, I, V, M, F, or Y) is present in anchor position 1 of a 9-mer core, and D is present as an anchor at position 4, towards the carboxyl terminus of the epitope. As in other class II motifs, core position 1 may or may not occupy the peptide N-terminal position.

The alternative DR3 submotif provides for lack of the large, hydrophobic residue at anchor position 1, and/or lack of the negatively charged or amide-like anchor residue at position 4, by the presence of a positive charge at position 6 towards the carboxyl terminus of the epitope. Thus, for the

alternative allele-specific DR3 motif (submotif DR3B): L, I, V, M, F, Y, A, or Y is present at anchor
position 1; D, N, Q, E, S, or T is present at anchor position 4; and K, R, or H is present at anchor position 6.
Peptide binding to HLA-DR3 can be modulated by substitutions at primary and/or secondary anchor
positions, preferably choosing respective residues specified for the motif.

Representative 9-mer epitopes corresponding to a nine residue sequence comprising the
DR3a and DR3b submotifs (wherein position 1 of the motif is at position 1 of the nine residue core) are set
forth in Table XXa and b. Exemplary epitopes of 15 amino acids in length that comprise the nine residue
core include the three residues on either side that flank the nine residue core. HTL epitopes that comprises
the cores sequences can also be of lengths other than 15 amino acids, *supra*. Accordingly, epitopes of the
invention include sequnces that typically comprise the nine residue core plus 1, 2, 3 (as in the exemplary
15-mer), 4, or 5 flanking residues on either side of the nine residue core..

Each of the HLA class I or class II epitopes set out in the Tables herein are deemed singly
to be an inventive aspect of this application. Further, it is also an inventive aspect of this application that
each epitope may be used in combination with any other epitope.

III.E. Enhancing Population Coverage of the Vaccine

Vaccines that have broad population coverage are preferred because they are more
commercially viable and generally applicable to the most people. Broad population coverage can be
obtained using the peptides of the invention (and nucleic acid compositions that encode such peptides)
through selecting peptide epitopes that bind to HLA alleles which, when considered in total, are present in
most of the population. The Table below lists the overall frequencies of the HLA class I supertypes in
various ethnicities (section a) and the combined population coverage achieved by the A2-, A3-, and B7-
supertypes (section b). The A2-, and B7 supertypes are each present on the average of over 40% in
each of these five major ethnic groups. Coverage in excess of 80% is achieved with a combination of these
supermotifs. These results suggest that effective and non-ethnically biased population coverage is achieved
upon use of a limited number of cross-reactive peptides. Although the population coverage reached with
these three main peptide specificities is high, coverage can be expanded to reach 95% population coverage
and above, and more easily achieve truly multispecific responses upon use of additional supermotif or
allele-specific motif bearing peptides.

The B44-, A1-, and A24-supertypes are each present, on average, in a range from 25% to
40% in these major ethnic populations (section a). While less prevalent overall, the B27-, B58-, and B62
supertypes are each present with a frequency >25% in at least one major ethnic group (section a). In section
b, the Table summarizes the estimated prevalence of combinations of HLA supertypes that have been
identified in five major ethnic groups. The incremental coverage obtained by the inclusion of A1,- A24-,
and B44-supertypes to the A2, A3, and B7 coverage and coverage obtained with all of the supertypes
described herein, is shown.

The data presented herein, together with the previous definition of the A2-, A3-, and B7-
supertypes, indicates that all antigens, with the possible exception of A29, B8, and B46, can be classified
into a total of nine HLA supertypes. By including epitopes from the six most frequent supertypes, an
average population coverage of 99% is obtained for five major ethnic groups.

Population coverage with combined HLA Supertypes

HLA-SUPERTYPES	PHENOTYPIC FREQUENCY					
	Caucasian	North American Black	Japanese	Chinese	Hispanic	Average
a. Individual Supertypes						
A2	45.8	39.0	42.4	45.9	43.0	43.2
A3	37.5	42.1	45.8	52.7	43.1	44.2
B7	43.2	55.1	57.1	43.0	49.3	49.5
A1	47.1	16.1	21.8	14.7	26.3	25.2
A24	23.9	38.9	58.6	40.1	38.3	40.0
B44	43.0	21.2	42.9	39.1	39.0	37.0
B27	28.4	26.1	13.3	13.9	35.3	23.4
B62	12.6	4.8	36.5	25.4	11.1	18.1
B58	10.0	25.1	1.6	9.0	5.9	10.3
b. Combined Supertypes						
A2, A3, B7	84.3	86.8	89.5	89.8	86.8	87.4
A2, A3, B7, A24, B44, A1	99.5	98.1	100.0	99.5	99.4	99.3
A2, A3, B7, A24, B44, A1, B27, B62, B58	99.9	99.6	100.0	99.8	99.9	99.8

III.F. Immune Response-Stimulating Peptide Analogs

5   In general, CTL and HTL responses to whole antigens are not directed against all possible

epitopes. Rather, they are restricted to a few "immunodominant" determinants (Zinkernagel, et al., Adv.

Immunol. 27:5159, 1979; Bennink, et al., J. Exp. Med. 168:19351939, 1988; Rawle, et al., J. Immunol.

146:3977-3984, 1991). It has been recognized that immunodominance (Benacerraf, et al., Science 175:273-

279, 1972) could be explained by either the ability of a given epitope to selectively bind a particular HLA

10   protein (determinant selection theory) (Vitiello, et al., J. Immunol. 131:1635, 1983); Rosenthal, et al.,

Nature 267:156-158, 1977), or to be selectively recognized by the existing TCR (T cell receptor)

specificities (repertoire theory) (Klein, J., IMMUNOLOGY, THE SCIENCE OF SELFNONSELF DISCRIMINATION,

John Wiley & Sons, New York, pp. 270-310, 1982). It has been demonstrated that additional factors,

mostly linked to processing events, can also play a key role in dictating, beyond strict immunogenicity,

15   which of the many potential determinants will be presented as immunodominant (Sercarz, et al., Annu. Rev.

Immunol. 11:729-766, 1993).

The concept of dominance and subdominance is relevant to immunotherapy of both

infectious diseases and cancer. For example, in the course of chronic viral disease, recruitment of

subdominant epitopes can be important for successful clearance of the infection, especially if dominant

20   CTL or HTL specificities have been inactivated by functional tolerance, suppression, mutation of viruses

and other mechanisms (Franco, et al., Curr. Opin. Immunol. 7:524-531, 1995). In the case of cancer and

tumor antigens, CTLs recognizing at least some of the highest binding affinity peptides might be

functionally inactivated. Lower binding affinity peptides are preferentially recognized at these times, and

may therefore be preferred in therapeutic or prophylactic anti-cancer vaccines.

25   In particular, it has been noted that a significant number of epitopes derived from known

non-viral tumor associated antigens (TAA) bind HLA class I with intermediate affinity (IC_{50} in the 50-500

nM range). For example, it has been found that 8 of 15 known TAA peptides recognized by tumor infiltrating lymphocytes (TIL) or CTL bind in the 50-500 nM range. (These data are in contrast with estimates that 90% of known viral antigens were bound by HLA class I molecules with IC_{50} of 50 nM or less, while only approximately 10% bound in the 50-500 nM range (Sette, *et al.*, *J. Immunol.*, 153:558-

5   5592, 1994). In the cancer setting this phenomenon is probably due to elimination or functional inhibition of the CTL recognizing several of the highest binding peptides, presumably because of T cell tolerization events.

Without intending to be bound by theory, it is believed that because T cells to dominant epitopes may have been clonally deleted, selecting subdominant epitopes may allow existing T cells to be

10   recruited, which will then lead to a therapeutic or prophylactic response. However, the binding of HLA molecules to subdominant epitopes is often less vigorous than to dominant ones. Accordingly, there is a need to be able to modulate the binding affinity of particular immunogenic epitopes for one or more HLA molecules, and thereby modulate the immune response elicited by the peptide, for example to prepare analog peptides which elicit a more vigorous response. This ability would greatly enhance the usefulness of

15   peptide epitope-based vaccines and therapeutic agents.

Although peptides with suitable cross-reactivity among alleles of a superfamily are identified by the screening procedures described above, cross-reactivity is not always as complete as possible, and in certain cases procedures to increase cross-reactivity of peptides can be useful; moreover, such procedures can also be used to modify other properties of the peptides such as binding affinity or

20   peptide stability. Having established the general rules that govern cross-reactivity of peptides for HLA alleles within a given motif or supermotif, modification (*i.e.*, analoging) of the structure of peptides of particular interest in order to achieve broader (or otherwise modified) HLA binding capacity can be performed. More specifically, peptides which exhibit the broadest cross-reactivity patterns, can be produced in accordance with the teachings herein. The present concepts related to analog generation are set

25   forth in greater detail in co-pending U.S.S.N. 09/226,775 filed 1/6/99.

In brief, the strategy employed utilizes the motifs or supermotifs which correlate with binding to certain HLA molecules. The motifs or supermotifs are defined by having primary anchors, and in many cases secondary anchors. Analog peptides can be created by substituting amino acid residues at primary anchor, secondary anchor, or at primary and secondary anchor positions. Generally, analogs are

30   made for peptides that already bear a motif or supermotif. Preferred secondary anchor residues of supermotifs and motifs that have been defined for HLA class I and class II binding peptides are shown in Tables II and III, respectively.

For a number of the motifs or supermotifs in accordance with the invention, residues are defined which are deleterious to binding to allele-specific HLA molecules or members of HLA supertypes

35   that bind the respective motif or supermotif (Tables II and III). Accordingly, removal of such residues that are detrimental to binding can be performed in accordance with the present invention. For example, in the case of the A3 supertype, when all peptides that have such deleterious residues are removed from the population of peptides used in the analysis, the incidence of cross-reactivity increased from 22% to 37% (*see, e.g.*, Sidney, J. *et al.*, *Hu. Immunol.* 45:79, 1996). Thus, one strategy to improve the cross-reactivity

40   of peptides within a given supermotif is simply to delete one or more of the deleterious residues present

within a peptide and substitute a small "neutral" residue such as Ala (that may not influence T cell recognition of the peptide). An enhanced likelihood of cross-reactivity is expected if, together with elimination of detrimental residues within a peptide, "preferred" residues associated with high affinity binding to an allele-specific HLA molecule or to multiple HLA molecules within a superfamily are inserted.

5   To ensure that an analog peptide, when used as a vaccine, actually elicits a CTL response to the native epitope *in vivo* (or, in the case of class II epitopes, elicits helper T cells that cross-react with the wild type peptides), the analog peptide may be used to immunize T cells *in vitro* from individuals of the appropriate HLA allele. Thereafter, the immunized cells' capacity to induce lysis of wild type peptide sensitized target cells is evaluated. It will be desirable to use as antigen presenting cells, cells that have

10 been either infected, or transfected with the appropriate genes, or, in the case of class II epitopes only, cells that have been pulsed with whole protein antigens, to establish whether endogenously produced antigen is also recognized by the relevant T cells.

          Another embodiment of the invention is to create analogs of weak binding peptides, to thereby ensure adequate numbers of cross-reactive cellular binders. Class I binding peptides exhibiting

15 binding affinities of 500-5000 nM, and carrying an acceptable but suboptimal primary anchor residue at one or both positions can be "fixed" by substituting preferred anchor residues in accordance with the respective supertype. The analog peptides can then be tested for crossbinding activity.

          Another embodiment for generating effective peptide analogs involves the substitution of residues that have an adverse impact on peptide stability or solubility in, *e.g.*, a liquid environment. This

20 substitution may occur at any position of the peptide epitope. For example, a cysteine (C) can be substituted out in favor of α-amino butyric acid. Due to its chemical nature, cysteine has the propensity to form disulfide bridges and sufficiently alter the peptide structurally so as to reduce binding capacity. Substituting α-amino butyric acid for C not only alleviates this problem, but actually improves binding and crossbinding capability in certain instances (*see, e.g.*, the review by Sette *et al.*, In: <u>Persistent Viral</u>

25 <u>Infections</u>, Eds. R. Ahmed and I. Chen, John Wiley & Sons, England, 1999). Substitution of cysteine with α-amino butyric acid may occur at any residue of a peptide epitope, *i.e.* at either anchor or non-anchor positions.

III.G. Computer Screening of Protein Sequences from Disease-Related Antigens for Supermotif- or

30 ### Motif-Bearing Peptides

          In order to identify supermotif- or motif-bearing epitopes in a target antigen, a native protein sequence, *e.g.*, a tumor-associated antigen, or sequences from an infectious organism, or a donor tissue for transplantation, is screened using a means for computing, such as an intellectual calculation or a computer, to determine the presence of a supermotif or motif within the sequence. The information

35 obtained from the analysis of native peptide can be used directly to evaluate the status of the native peptide or may be utilized subsequently to generate the peptide epitope.

          Computer programs that allow the rapid screening of protein sequences for the occurrence of the subject supermotifs or motifs are encompassed by the present invention; as are programs that permit the generation of analog peptides. These programs are implemented to analyze any identified amino acid

40 sequence or operate on an unknown sequence and simultaneously determine the sequence and identify

motif-bearing epitopes thereof; analogs can be simultaneously determined as well. Generally, the identified sequences will be from a pathogenic organism or a tumor-associated peptide. For example, the target molecules considered herein include, without limitation, the E1, E2, E4, E5a, E5b, E6, E7, L1 and L2 proteins of HPV.

5   In cases where the sequences of multiple variants of the same target protein are available, potential peptide epitopes can also be selected on the basis of their conservancy. For example, a criterion for conservancy may define that the entire sequence of an HLA class I binding peptide or the entire 9-mer core of a class II binding peptide, be conserved in a designated percentage, of the sequences evaluated for a specific protein antigen.

10   To target a broad population that may be infected with a number of different strains, it is preferable to include in vaccine compositions epitopes that are representative of HPV antigen sequences from different HPV strains. As appreciated by those in the art, regions with greater or lessor degrees of conservancy among HPv strains can be employed as appropriate for a given antigenic target.

           It is important that the selection criteria utilized for prediction of peptide binding are as

15 accurate as possible, to correlate most efficiently with actual binding. Prediction of peptides that bind, for example, to HLA-A*0201, on the basis of the presence of the appropriate primary anchors, is positive at about a 30% rate (see, e.g., Ruppert, J. et al. Cell 74:929, 1993). However, by extensively analyzing peptide-HLA binding data disclosed herein, data in related patent applications, and data in the art, the present inventors have developed a number of allele-specific polynomial algorithms that dramatically

20 increase the predictive value over identification on the basis of the presence of primary anchor residues alone. These algorithms take into account not only the presence or absence of primary anchors, but also consider the positive or deleterious presence of secondary anchor residues (to account for the impact of different amino acids at different positions). The algorithms are essentially based on the premise that the overall affinity (or ∆G) of peptide-HLA interactions can be approximated as a linear polynomial function of

25 the type:

$$\Delta G = a_{1j} \times a_{2j} \times a_{3j} \ldots \times a_{nj}$$

where a_{ji} is a coefficient that represents the effect of the presence of a given amino acid (j) at a given position (i) along the sequence of a peptide of n amino acids. An important assumption of this method is that the effects at each position are essentially independent of each other. This assumption is

30 justified by studies that demonstrated that peptides are bound to HLA molecules and recognized by T cells in essentially an extended conformation. Derivation of specific algorithm coefficients has been described, for example, in Gulukota, K. et al., J. Mol. Biol. 267:1258, 1997.

           Additional methods to identify preferred peptide sequences, which also make use of specific motifs, include the use of neural networks and molecular modeling programs (see, e.g., Milik et al.,

35 Nature Biotechnology 16:753, 1998; Altuvia et al., Hum. Immunol. 58:1, 1997; Altuvia et al., J. Mol. Biol. 249:244, 1995; Buus, S. Curr. Opin. Immunol. 11:209-213, 1999; Brusic, V. et al., Bioinformatics 14:121-130, 1998; Parker et al., J. Immunol. 152:163, 1993; Meister et al., Vaccine 13:581, 1995; Hammer et al., J. Exp. Med. 180:2353, 1994; Sturniolo et al., Nature Biotechnol. 17:555 1999).

           For example, it has been shown that in sets of A*0201 motif-bearing peptides containing

40 at least one preferred secondary anchor residue while avoiding the presence of any deleterious secondary

anchor residues, 69% of the peptides will bind A*0201 with an IC_{50} less than 500 nM (Ruppert, *J. et al.*
Cell 74:929, 1993). These algorithms are also flexible in that cut-off scores may be adjusted to select sets
of peptides with greater or lower predicted binding properties, as desired.

          In utilizing computer screening to identify peptide epitopes, a protein sequence or

5   translated sequence may be analyzed using software developed to search for motifs, for example the
"FINDPATTERNS' program (Devereux, *et al. Nucl. Acids Res.* 12:387-395, 1984) or MotifSearch 1.4
software program (D. Brown, San Diego, CA) to identify potential peptide sequences containing
appropriate HLA binding motifs. The identified peptides can be scored using customized polynomial
algorithms to predict their capacity to bind specific HLA class I or class II alleles. As appreciated by one of

10   ordinary skill in the art, a large array of computer programming software and hardware options are available
in the relevant art which can be employed to implement the motifs of the invention in order to evaluate
(*e.g.*, without limitation, to identify epitopes, identify epitope concentration per peptide length, or to
generate analogs) known or unknown peptide sequences.

          In accordance with the procedures described above, HPV peptide epitopes that are able to

15   bind HLA supertype groups or allele-specific HLA molecules have been identified (Tables VII-XX).

III.H. Preparation of Peptide Epitopes

          Peptides in accordance with the invention can be prepared synthetically, by recombinant
DNA technology or chemical synthesis, or from natural sources such as native tumors or pathogenic

20   organisms. Peptide epitopes may be synthesized individually or as polyepitopic peptides. Although the
peptide will preferably be substantially free of other naturally occurring host cell proteins and fragments
thereof, in some embodiments the peptides may be synthetically conjugated to native fragments or particles.

          The peptides in accordance with the invention can be a variety of lengths, and either in
their neutral (uncharged) forms or in forms which are salts. The peptides in accordance with the invention

25   are either free of modifications such as glycosylation, side chain oxidation, or phosphorylation; or they
contain these modifications, subject to the condition that modifications do not destroy the biological activity
of the peptides as described herein.

          When possible, it may be desirable to optimize HLA class I binding epitopes of the
invention, such as can be used in a polyepitopic construct, to a length of about 8 to about 13 amino acid

30   residues, often 8 to 11, preferably 9 to 10. HLA class II binding peptide epitopes of the invention may be
optimized to a length of about 6 to about 30 amino acids in length, preferably to between about 13 and
about 20 residues. Preferably, the peptide epitopes are commensurate in size with endogenously processed
pathogen-derived peptides or tumor cell peptides that are bound to the relevant HLA molecules, however,
the identification and preparation of peptides that comprise epitopes of the invention can also be carried out

35   using the techniques described herein.

          In alternative embodiments, epitopes of the invention can be linked as a polyepitopic
peptide, or as a minigene that encodes a polyepitopic peptide.

          In another embodiment, it is preferred to identify native peptide regions that contain a
high concentration of class I and/or class II epitopes. Such a sequence is generally selected on the basis that

40   it contains the greatest number of epitopes per amino acid length. It is to be appreciated that epitopes can

be present in a nested or overlapping manner, *e.g.* a 10 amino acid long peptide could contain two 9 amino acid long epitopes and one 10 amino acid long epitope; upon intracellular processing, each epitope can be exposed and bound by an HLA molecule upon administration of such a peptide. This larger, preferably multi-epitopic, peptide can be generated synthetically, recombinantly, or via cleavage from the native

5   source.

The peptides of the invention can be prepared in a wide variety of ways. For the preferred relatively short size, the peptides can be synthesized in solution or on a solid support in accordance with conventional techniques. Various automatic synthesizers are commercially available and can be used in accordance with known protocols. (*See*, for example, Stewart & Young, SOLID PHASE

10   PEPTIDE SYNTHESIS, 2D. ED., Pierce Chemical Co., 1984). Further, individual peptide epitopes can be joined using chemical ligation to produce larger peptides that are still within the bounds of the invention.

Alternatively, recombinant DNA technology can be employed wherein a nucleotide sequence which encodes an immunogenic peptide of interest is inserted into an expression vector, transformed or transfected into an appropriate host cell and cultivated under conditions suitable for

15   expression. These procedures are generally known in the art, as described generally in Sambrook *et al.*, MOLECULAR CLONING, A LABORATORY MANUAL, Cold Spring Harbor Press, Cold Spring Harbor, New York (1989). Thus, recombinant polypeptides which comprise one or more peptide sequences of the invention can be used to present the appropriate T cell epitope.

The nucleotide coding sequence for peptide epitopes of the preferred lengths

20   contemplated herein can be synthesized by chemical techniques, for example, the phosphotriester method of Matteucci, *et al.*, *J. Am. Chem. Soc.* 103:3185 (1981). Peptide analogs can be made simply by substituting the appropriate and desired nucleic acid base(s) for those that encode the native peptide sequence; exemplary nucleic acid substitutions are those that encode an amino acid defined by the motifs/supermotifs herein. The coding sequence can then be provided with appropriate linkers and ligated into expression

25   vectors commonly available in the art, and the vectors used to transform suitable host cells to produce the desired fusion protein. A number of such vectors and suitable host systems are now available. For expression of the fusion proteins, the coding sequence will be provided with operably linked start and stop codons, promoter and terminator regions and usually a replication system to provide an expression vector for expression in the desired cellular host. For example, promoter sequences compatible with bacterial

30   hosts are provided in plasmids containing convenient restriction sites for insertion of the desired coding sequence. The resulting expression vectors are transformed into suitable bacterial hosts. Of course, yeast, insect or mammalian cell hosts may also be used, employing suitable vectors and control sequences.

III.I. Assays to Detect T-Cell Responses

35   Once HLA binding peptides are identified, they can be tested for the ability to elicit a T-cell response. The preparation and evaluation of motif-bearing peptides are described in PCT publications WO 94/20127 and WO 94/03205. Briefly, peptides comprising epitopes from a particular antigen are synthesized and tested for their ability to bind to the appropriate HLA proteins. These assays may involve evaluating the binding of a peptide of the invention to purified HLA class I molecules in relation to the

40   binding of a radioiodinated reference peptide. Alternatively, cells expressing empty class I molecules (*i.e.*

40

lacking peptide therein) may be evaluated for peptide binding by immunofluorescent staining and flow microfluorimetry. Other assays that may be used to evaluate peptide binding include peptide-dependent class I assembly assays and/or the inhibition of CTL recognition by peptide competition. Those peptides that bind to the class I molecule, typically with an affinity of 500 nM or less, are further evaluated for their
5   ability to serve as targets for CTLs derived from infected or immunized individuals, as well as for their capacity to induce primary *in vitro* or *in vivo* CTL responses that can give rise to CTL populations capable of reacting with selected target cells associated with a disease.

Analogous assays are used for evaluation of HLA class II binding peptides. HLA class II motif-bearing peptides that are shown to bind, typically at an affinity of 1000 nM or less, are further
10   evaluated for the ability to stimulate HTL responses.

Conventional assays utilized to detect T cell responses include proliferation assays, lymphokine secretion assays, direct cytotoxicity assays, and limiting dilution assays. For example, antigen-presenting cells that have been incubated with a peptide can be assayed for the ability to induce CTL responses in responder cell populations. Antigen-presenting cells can be normal cells such as peripheral
15   blood mononuclear cells or dendritic cells. Alternatively, mutant non-human mammalian cell lines that are deficient in their ability to load class I molecules with internally processed peptides and that have been transfected with the appropriate human class I gene, may be used to test for the capacity of the peptide to induce *in vitro* primary CTL responses.

Peripheral blood mononuclear cells (PBMCs) may be used as the responder cell source of
20   CTL precursors. The appropriate antigen-presenting cells are incubated with peptide, after which the peptide-loaded antigen-presenting cells are then incubated with the responder cell population under optimized culture conditions. Positive CTL activation can be determined by assaying the culture for the presence of CTLs that kill radio-labeled target cells, both specific peptide-pulsed targets as well as target cells expressing endogenously processed forms of the antigen from which the peptide sequence was
25   derived.

Additionally, a method has been devised which allows direct quantification of antigen-specific T cells by staining with Fluorescein-labelled HLA tetrameric complexes (Altman, J. D. *et al.*, *Proc. Natl. Acad. Sci. USA* 90:10330, 1993; Altman, J. D. *et al.*, *Science* 274:94, 1996). Other relatively recent technical developments include staining for intracellular lymphokines, and interferon release assays or
30   ELISPOT assays. Tetramer staining, intracellular lymphokine staining and ELISPOT assays all appear to be at least 10-fold more sensitive than more conventional assays (Lalvani, A. *et al.*, *J. Exp. Med.* 186:859, 1997; Dunbar, P. R. *et al.*, *Curr. Biol.* 8:413, 1998; Murali-Krishna, K. *et al.*, *Immunity* 8:177, 1998).

HTL activation may also be assessed using such techniques known to those in the art such as T cell proliferation and secretion of lymphokines, *e.g.* IL-2 (*see, e.g.* Alexander *et al.*, Immunity 1:751-
35   761, 1994).

Alternatively, immunization of HLA transgenic mice can be used to determine immunogenicity of peptide epitopes. Several transgenic mouse models including mice with human A2.1, A11 (which can additionally be used to analyze HLA-A3 epitopes), and B7 alleles have been characterized and others (*e.g.*, transgenic mice for HLA-A1 and A24) are being developed. HLA-DR1 and HLA-DR3
40   mouse models have also been developed. Additional transgenic mouse models with other HLA alleles may

be generated as necessary. Mice may be immunized with peptides emulsified in Incomplete Freund's
Adjuvant and the resulting T cells tested for their capacity to recognize peptide-pulsed target cells and
target cells transfected with appropriate genes. CTL responses may be analyzed using cytotoxicity assays
described above. Similarly, HTL responses may be analyzed using such assays as T cell proliferation or
5   secretion of lymphokines.

III.J.   Use of Peptide Epitopes as Diagnostic Agents and for Evaluating Immune Responses

          In one aspect of the invention, HLA class I and class II binding peptides as described
herein can be used as reagents to evaluate an immune response. The immune response to be evaluated is
10   induced by using as an immunogen any agent that may result in the production of antigen-specific CTLs or
HTLs that recognize and bind to the peptide epitope(s) to be employed as the reagent. The peptide reagent
need not be used as the immunogen. Assay systems that are used for such an analysis include relatively
recent technical developments such as tetramers, staining for intracellular lymphokines and interferon
release assays, or ELISPOT assays.

15   For example, a peptide of the invention is used in a tetramer staining assay to assess
peripheral blood mononuclear cells for the presence of antigen-specific CTLs following exposure to a
pathogen or immunogen. The HLA-tetrameric complex is used to directly visualize antigen-specific CTLs
(see, e.g., Ogg et al., Science 279:2103-2106, 1998; and Altman et al., Science 174:94-96, 1996) and
determine the frequency of the antigen-specific CTL population in a sample of peripheral blood
20   mononuclear cells.

          A tetramer reagent using a peptide of the invention is generated as follows: A peptide
that binds to an HLA molecule is refolded in the presence of the corresponding HLA heavy chain and β_2-
microglobulin to generate a trimolecular complex. The complex is biotinylated at the carboxyl terminal end
of the heavy chain at a site that was previously engineered into the protein. Tetramer formation is then
25   induced by the addition of streptavidin. By means of fluorescently labeled streptavidin, the tetramer can be
used to stain antigen-specific cells. The cells can then be readily identified, for example, by flow
cytometry. Such procedures are used for diagnostic or prognostic purposes. Cells identified by the
procedure can also be used for therapeutic purposes.

          Peptides of the invention are also used as reagents to evaluate immune recall responses.
30   (see, e.g., Bertoni et al., J. Clin. Invest. 100:503-513, 1997 and Penna et al., J. Exp. Med. 174:1565-1570,
1991.) For example, patient PBMC samples from individuals infected with HPV are analyzed for the
presence of antigen-specific CTLs or HTLs using specific peptides. A blood sample containing
mononuclear cells may be evaluated by cultivating the PBMCs and stimulating the cells with a peptide of
the invention. After an appropriate cultivation period, the expanded cell population may be analyzed, for
35   example, for CTL or for HTL activity.

          The peptides are also used as reagents to evaluate the efficacy of a vaccine. PBMCs
obtained from a patient vaccinated with an immunogen are analyzed using, for example, either of the
methods described above. The patient is HLA typed, and peptide epitope reagents that recognize the allele-
specific molecules present in that patient are selected for the analysis. The immunogenicity of the vaccine
40   is indicated by the presence of HPV epitope-specific CTLs and/or HTLs in the PBMC sample.

The peptides of the invention are also used to make antibodies, using techniques well known in the art (see, *e.g. CURRENT PROTOCOLS IN IMMUNOLOGY*, Wiley/Greene, NY; and *Antibodies A Laboratory Manual Harlow*, Harlow and Lane, Cold Spring Harbor Laboratory Press, 1989), which may be useful as reagents to diagnose HPV infection. Such antibodies include those that recognize a peptide in the context of an HLA molecule, *i.e.*, antibodies that bind to a peptide-MHC complex.

III.K.   Vaccine Compositions

Vaccines and methods of preparing vaccines that contain an immunogenically effective amount of one or more peptides as described herein are further embodiments of the invention. Once appropriately immunogenic epitopes have been defined, they can be sorted and delivered by various means, herein referred to as "vaccine" compositions. Such vaccine compositions can include, for example, lipopeptides (*e.g.*,Vitiello, A. *et al.*, *J. Clin. Invest.* 95:341, 1995), peptide compositions encapsulated in poly(DL-lactide-co-glycolide) ("PLG") microspheres (*see, e.g.*, Eldridge, *et al.*, *Molec. Immunol.* 28:287-294, 1991: Alonso *et al.*, *Vaccine* 12:299-306, 1994; Jones *et al.*, *Vaccine* 13:675-681, 1995), peptide compositions contained in immune stimulating complexes (ISCOMS) (*see, e.g.*, Takahashi *et al.*, *Nature* 344:873-875, 1990; Hu *et al.*, *Clin Exp Immunol.* 113:235-243, 1998), multiple antigen peptide systems (MAPs) (*see e.g.*, Tam, J. P., *Proc. Natl. Acad. Sci. U.S.A.* 85:5409-5413, 1988; Tam, J.P., *J. Immunol. Methods* 196:17-32, 1996), peptides formulated as multivalent peptides; peptides for use in ballistic delivery systems, typically crystallized peptides, viral delivery vectors (Perkus, M. E. *et al.*, In: *Concepts in vaccine development*, Kaufmann, S. H. E., ed., p. 379, 1996; Chakrabarti, S. *et al.*, *Nature* 320:535, 1986; Hu, S. L. *et al.*, *Nature* 320:537, 1986; Kieny, M.-P. *et al.*, *AIDS Bio/Technology* 4:790, 1986; Top, F. H. *et al.*, *J. Infect. Dis.* 124:148, 1971; Chanda, P. K. *et al.*, *Virology* 175:535, 1990), particles of viral or synthetic origin (*e.g.*, Kofler, N. *et al.*, *J. Immunol. Methods.* 192:25, 1996; Eldridge, J. H. *et al.*, *Sem. Hematol.* 30:16, 1993; Falo, L. D., Jr. *et al.*, *Nature Med.* 7:649, 1995), adjuvants (Warren, H. S., Vogel, F. R., and Chedid, L. A. *Annu. Rev. Immunol.* 4:369, 1986; Gupta, R. K. *et al.*, *Vaccine* 11:293, 1993), liposomes (Reddy, R. *et al.*, *J. Immunol.* 148:1585, 1992; Rock, K. L., *Immunol. Today* 17:131, 1996), or, naked or particle absorbed cDNA (Ulmer, J. B. *et al.*, *Science* 259:1745, 1993; Robinson, H. L., Hunt, L. A., and Webster, R. G., *Vaccine* 11:957, 1993; Shiver, J. W. *et al.*, In: *Concepts in vaccine development*, Kaufmann, S. H. E., ed., p. 423, 1996; Cease, K. B., and Berzofsky, J. A., *Annu. Rev. Immunol.* 12:923, 1994 and Eldridge, J. H. *et al.*, *Sem. Hematol.* 30:16, 1993). Toxin-targeted delivery technologies, also known as receptor mediated targeting, such as those of Avant Immunotherapeutics, Inc. (Needham, Massachusetts) may also be used.

Vaccine compositions of the invention include nucleic acid-mediated modalities. DNA or RNA encoding one or more of the peptides of the invention can also be administered to a patient. This approach is described, for instance, in Wolff *et. al.*, *Science* 247:1465 (1990) as well as U.S. Patent Nos. 5,580,859; 5,589,466; 5,804,566; 5,739,118; 5,736,524; 5,679,647; WO 98/04720; and in more detail below. Examples of DNA-based delivery technologies include "naked DNA", facilitated (bupivicaine, polymers, peptide-mediated) delivery, cationic lipid complexes, and particle-mediated ("gene gun") or pressure-mediated delivery (*see, e.g.*, U.S. Patent No. 5,922,687).

For therapeutic or prophylactic immunization purposes, the peptides of the invention can be expressed by viral or bacterial vectors. Examples of expression vectors include attenuated viral hosts, such as vaccinia or fowlpox. This approach involves the use of vaccinia virus, for example, as a vector to express nucleotide sequences that encode the peptides of the invention. Upon introduction into an acutely or chronically infected host or into a non-infected host, the recombinant vaccinia virus expresses the immunogenic peptide, and thereby elicits a host CTL and/or HTL response. Vaccinia vectors and methods useful in immunization protocols are described in, *e.g.*, U.S. Patent No. 4,722,848. Another vector is BCG (Bacille Calmette Guerin). BCG vectors are described in Stover *et al.*, *Nature* 351:456-460 (1991). A wide variety of other vectors useful for therapeutic administration or immunization of the peptides of the invention, *e.g.* adeno and adeno-associated virus vectors, retroviral vectors, *Salmonella typhi* vectors, detoxified anthrax toxin vectors, and the like, will be apparent to those skilled in the art from the description herein.

Furthermore, vaccines in accordance with the invention encompass compositions of one or more of the claimed peptides. A peptide can be present in a vaccine individually. Alternatively, the peptide can exist as a homopolymer comprising multiple copies of the same peptide, or as a heteropolymer of various peptides. Polymers have the advantage of increased immunological reaction and, where different peptide epitopes are used to make up the polymer, the additional ability to induce antibodies and/or CTLs that react with different antigenic determinants of the pathogenic organism or tumor-related peptide targeted for an immune response. The composition can be a naturally occurring region of an antigen or can be prepared, *e.g.*, recombinantly or by chemical synthesis.

Carriers that can be used with vaccines of the invention are well known in the art, and include, *e.g.*, thyroglobulin, albumins such as human serum albumin, tetanus toxoid, polyamino acids such as poly L-lysine, poly L-glutamic acid, influenza, hepatitis B virus core protein, and the like. The vaccines can contain a physiologically tolerable (*i.e.*, acceptable) diluent such as water, or saline, preferably phosphate buffered saline. The vaccines also typically include an adjuvant. Adjuvants such as incomplete Freund's adjuvant, aluminum phosphate, aluminum hydroxide, or alum are examples of materials well known in the art. Additionally, as disclosed herein, CTL responses can be primed by conjugating peptides of the invention to lipids, such as tripalmitoyl-S-glycerylcysteinlyseryl- serine (P$_3$CSS).

Upon immunization with a peptide composition in accordance with the invention, via injection, aerosol, oral, transdermal, transmucosal, intrapleural, intrathecal, or other suitable routes, the immune system of the host responds to the vaccine by producing large amounts of CTLs and/or HTLs specific for the desired antigen. Consequently, the host becomes at least partially immune to later infection, or at least partially resistant to developing an ongoing chronic infection, or derives at least some therapeutic benefit when the antigen was tumor-associated.

In some embodiments, it may be desirable to combine the class I peptide components with components that induce or facilitate neutralizing antibody and or helper T cell responses to the target antigen of interest. A preferred embodiment of such a composition comprises class I and class II epitopes in accordance with the invention. An alternative embodiment of such a composition comprises a class I and/or class II epitope in accordance with the invention, along with a cross reactive HTL epitope such as PADRE™ (Epimmune, San Diego, CA) molecule(described *e.g.*, in U.S. Patent Number 5,736,142).

A vaccine of the invention can also include antigen-presenting cells (APC), such as dendritic cells (DC), as a vehicle to present peptides of the invention. Vaccine compositions can be created *in vitro*, following dendritic cell mobilization and harvesting, whereby loading of dendritic cells occurs *in vitro*. For example, dendritic cells are transfected, *e.g.*, with a minigene in accordance with the invention, or are pulsed with peptides. The dendritic cell can then be administered to a patient to elicit immune responses *in vivo*.

Vaccine compositions, either DNA- or peptide-based, can also be administered *in vivo* in combination with dendritic cell mobilization whereby loading of dendritic cells occurs *in vivo*.

Antigenic peptides are used to elicit a CTL and/or HTL response *ex vivo*, as well. The resulting CTL or HTL cells, can be used to treat chronic infections, or tumors in patients that do not respond to other conventional forms of therapy, or will not respond to a therapeutic vaccine peptide or nucleic acid in accordance with the invention. *Ex vivo* CTL or HTL responses to a particular antigen (infectious or tumor-associated antigen) are induced by incubating in tissue culture the patient's, or genetically compatible, CTL or HTL precursor cells together with a source of antigen-presenting cells (APC), such as dendritic cells, and the appropriate immunogenic peptide. After an appropriate incubation time (typically about 7-28 days), in which the precursor cells are activated and expanded into effector cells, the cells are infused back into the patient, where they will destroy (CTL) or facilitate destruction (HTL) of their specific target cell (an infected cell or a tumor cell). Transfected dendritic cells may also be used as antigen presenting cells.

The vaccine compositions of the invention may also be used in combination with other procedures to remove warts or treat HPV infections. Such procedures include cryosurgery, application of caustic agents, electrodessication, surgical excision and laser ablation (Fauci et al. HARRISON'S PRINCIPLES OF INTERNAL MEDICINE, 14th ED., McGraw-Hill Co., Inc, 1998), as well as treatment with antiviral drugs such as interferon-α (see, e.g., Stellato, G., et al., Clin. Diagn. Virol. 7(3):167-72 (1997)) or interferon-inducing drugs such as imiquimod. Topical antimetabolites such a 5-fluorouracil may also be applied.

In patients with HPV-associated cancer, the vaccine compositions of the invention can also be used in conjunction with other treatments used for cancer, *e.g.*, surgery, chemotherapy, drug therapies, radiation therapies, *etc.* including use in combination with immune adjuvants such as IL-2, IL-12, GM-CSF, and the like.

Preferably, the following principles are utilized when selecting an array of epitopes for inclusion in a polyepitopic composition for use in a vaccine, or for selecting discrete epitopes to be included in a vaccine and/or to be encoded by nucleic acids such as a minigene. It is preferred that each of the following principles are balanced in order to make the selection. The multiple epitopes to be incorporated in a given vaccine composition may be, but need not be, contiguous in sequence in the native antigen from which the epitopes are derived.

1.) Epitopes are selected which, upon administration, mimic immune responses that have been observed to be correlated with clearance of HPV infection or tumor clearance. For HLA Class I this includes 3-4 epitopes that come from at least one TAA. For HLA Class II a similar rationale is employed; again 3-4 epitopes are selected from at least one TAA (*see, e.g.*, Rosenberg *et al., Science*

278:1447-1450). Epitopes from one TAA may be used in combination with epitopes from one or more additional TAAs to produce a vaccine that targets tumors with varying expression patterns of frequently-expressed TAAs as described, *e.g.*, in Example 15.

2.)   Epitopes are selected that have the requisite binding affinity established to be correlated with immunogenicity: for HLA Class I an IC_{50} of 500 nM or less, often 200 nM or less; and for Class II an IC_{50} of 1000 nM or less.

3.)   Sufficient supermotif bearing-peptides, or a sufficient array of allele-specific motif-bearing peptides, are selected to give broad population coverage. For example, it is preferable to have at least 80% population coverage. A Monte Carlo analysis, a statistical evaluation known in the art, can be employed to assess the breadth, or redundancy of, population coverage.

4.)   When selecting epitopes from cancer-related antigens it is often useful to select analogs because the patient may have developed tolerance to the native epitope. When selecting epitopes for infectious disease-related antigens it is preferable to select either native or analoged epitopes.

5.)   Of particular relevance are epitopes referred to as "nested epitopes." Nested epitopes occur where at least two epitopes overlap in a given peptide sequence. A nested peptide sequence can comprise both HLA class I and HLA class II epitopes. When providing nested epitopes, a general objective is to provide the greatest number of epitopes per sequence. Thus, an aspect is to avoid providing a peptide that is any longer than the amino terminus of the amino terminal epitope and the carboxyl terminus of the carboxyl terminal epitope in the peptide. When providing a multi-epitopic sequence, such as a sequence comprising nested epitopes, it is generally important to screen the sequence in order to insure that it does not have pathological or other deleterious biological properties.

6.)   If a polyepitopic protein is created, or when creating a minigene, an objective is to generate the smallest peptide that encompasses the epitopes of interest. This principle is similar, if not the same as that employed when selecting a peptide comprising nested epitopes. However, with an artificial polyepitopic peptide, the size minimization objective is balanced against the need to integrate any spacer sequences between epitopes in the polyepitopic protein. Spacer amino acid residues can, for example, be introduced to avoid junctional epitopes (an epitope recognized by the immune system, not present in the target antigen, and only created by the man-made juxtaposition of epitopes), or to facilitate cleavage between epitopes and thereby enhance epitope presentation. Junctional epitopes are generally to be avoided because the recipient may generate an immune response to that non-native epitope. Of particular concern is a junctional epitope that is a "dominant epitope." A dominant epitope may lead to such a zealous response that immune responses to other epitopes are diminished or suppressed.

7.)   In cases where the sequences of multiple variants of the same target protein are available, potential peptide epitopes can also be selected on the basis of their conservancy. For example, a criterion for conservancy may define that the entire sequence of an HLA class I binding peptide or the entire 9-mer core of a class II binding peptide be conserved in a designated percentage of the sequences evaluated for a specific protein antigen.

8.)   When selecting an array of epitopes of an infectious agent, it is preferred that at least some of the epitopes are derived from early and late proteins. The early proteins of HPV are expressed when the virus is replicating, either following acute or dormant infection. Therefore, it is

particularly preferred to use epitopes from early stage proteins to alleviate disease manifestations at the earliest stage possible.

III.K.1. Minigene Vaccines

5   A number of different approaches are available which allow simultaneous delivery of multiple epitopes. Nucleic acids encoding the peptides of the invention are a particularly useful embodiment of the invention. Epitopes for inclusion in a minigene are preferably selected according to the guidelines set forth in the previous section. A preferred means of administering nucleic acids encoding the peptides of the invention uses minigene constructs encoding a peptide comprising one or multiple epitopes

10   of the invention.

        The use of multi-epitope minigenes is described below and in, *e.g.*, co-pending application U.S.S.N. 09/311,784; Ishioka *et al., J. Immunol.* 162:3915-3925, 1999; An, L. and Whitton, J. L., *J. Virol.* 71:2292, 1997; Thomson, S. A. *et al., J. Immunol.* 157:822, 1996; Whitton, J. L. *et al., J. Virol.* 67:348, 1993; Hanke, R. *et al., Vaccine* 16:426, 1998. For example, a multi-epitope DNA plasmid

15   encoding supermotif- and/or motif-bearing epitopes derived from multiple regions of one or more HPV antigens, the PADRE universal helper T cell epitope (or multiple HTL epitopes from HPV antigens), and an endoplasmic reticulum-translocating signal sequence can be engineered. A vaccine may also comprise epitopes that are derived from other TAAs.

        The immunogenicity of a multi-epitopic minigene can be tested in transgenic mice to

20   evaluate the magnitude of CTL induction responses against the epitopes tested. Further, the immunogenicity of DNA-encoded epitopes *in vivo* can be correlated with the *in vitro* responses of specific CTL lines against target cells transfected with the DNA plasmid. Thus, these experiments can show that the minigene serves to both: 1.) generate a CTL response and 2.) that the induced CTLs recognized cells expressing the encoded epitopes.

25   For example, to create a DNA sequence encoding the selected epitopes (minigene) for expression in human cells, the amino acid sequences of the epitopes may be reverse translated. A human codon usage table can be used to guide the codon choice for each amino acid. These epitope-encoding DNA sequences may be directly adjoined, so that when translated, a continuous polypeptide sequence is created. To optimize expression and/or immunogenicity, additional elements can be incorporated into the

30   minigene design. Examples of amino acid sequences that can be reverse translated and included in the minigene sequence include: HLA class I epitopes, HLA class II epitopes, a ubiquitination signal sequence, and/or an endoplasmic reticulum targeting signal. In addition, HLA presentation of CTL and HTL epitopes may be improved by including synthetic (*e.g.* poly-alanine) or naturally-occurring flanking sequences adjacent to the CTL or HTL epitopes; these larger peptides comprising the epitope(s) are within the scope

35   of the invention.

        The minigene sequence may be converted to DNA by assembling oligonucleotides that encode the plus and minus strands of the minigene. Overlapping oligonucleotides (30-100 bases long) may be synthesized, phosphorylated, purified and annealed under appropriate conditions using well known techniques. The ends of the oligonucleotides can be joined, for example, using T4 DNA ligase. This

40   synthetic minigene, encoding the epitope polypeptide, can then be cloned into a desired expression vector.

Standard regulatory sequences well known to those of skill in the art are preferably included in the vector to ensure expression in the target cells. Several vector elements are desirable: a promoter with a down-stream cloning site for minigene insertion; a polyadenylation signal for efficient transcription termination; an *E. coli* origin of replication; and an *E. coli* selectable marker (*e.g.* ampicillin or

5   kanamycin resistance). Numerous promoters can be used for this purpose, *e.g.*, the human cytomegalovirus (hCMV) promoter. See, *e.g.*, U.S. Patent Nos. 5,580,859 and 5,589,466 for other suitable promoter sequences.

Additional vector modifications may be desired to optimize minigene expression and immunogenicity. In some cases, introns are required for efficient gene expression, and one or more

10   synthetic or naturally-occurring introns could be incorporated into the transcribed region of the minigene. The inclusion of mRNA stabilization sequences and sequences for replication in mammalian cells may also be considered for increasing minigene expression.

Once an expression vector is selected, the minigene is cloned into the polylinker region downstream of the promoter. This plasmid is transformed into an appropriate *E. coli* strain, and DNA is

15   prepared using standard techniques. The orientation and DNA sequence of the minigene, as well as all other elements included in the vector, are confirmed using restriction mapping and DNA sequence analysis. Bacterial cells harboring the correct plasmid can be stored as a master cell bank and a working cell bank.

In addition, immunostimulatory sequences (ISSs or CpGs) appear to play a role in the immunogenicity of DNA vaccines. These sequences may be included in the vector, outside the minigene

20   coding sequence, if desired to enhance immunogenicity.

In some embodiments, a bi-cistronic expression vector which allows production of both the minigene-encoded epitopes and a second protein (included to enhance or decrease immunogenicity) can be used. Examples of proteins or polypeptides that could beneficially enhance the immune response if co-expressed include cytokines (*e.g.*, IL-2, IL-12, GM-CSF), cytokine-inducing molecules (*e.g.*, LeIF),

25   costimulatory molecules, or for HTL responses, pan-DR binding proteins (PADRE™, Epimmune, San Diego, CA). Helper (HTL) epitopes can be joined to intracellular targeting signals and expressed separately from expressed CTL epitopes; this allows direction of the HTL epitopes to a cell compartment different than that of the CTL epitopes. If required, this could facilitate more efficient entry of HTL epitopes into the HLA class II pathway, thereby improving HTL induction. In contrast to HTL or CTL induction,

30   specifically decreasing the immune response by co-expression of immunosuppressive molecules (*e.g.* TGF-β) may be beneficial in certain diseases.

Therapeutic quantities of plasmid DNA can be produced for example, by fermentation in *E. coli*, followed by purification. Aliquots from the working cell bank are used to inoculate growth medium, and grown to saturation in shaker flasks or a bioreactor according to well known techniques.

35   Plasmid DNA can be purified using standard bioseparation technologies such as solid phase anion-exchange resins supplied by QIAGEN, Inc. (Valencia, California). If required, supercoiled DNA can be isolated from the open circular and linear forms using gel electrophoresis or other methods.

Purified plasmid DNA can be prepared for injection using a variety of formulations. The simplest of these is reconstitution of lyophilized DNA in sterile phosphate-buffer saline (PBS). This

40   approach, known as "naked DNA," is currently being used for intramuscular (IM) administration in clinical

trials. To maximize the immunotherapeutic effects of minigene DNA vaccines, an alternative method for formulating purified plasmid DNA may be desirable. A variety of methods have been described, and new techniques may become available. Cationic lipids, glycolipids, and fusogenic liposomes can also be used in the formulation (see, e.g., as described by WO 93/24640; Mannino & Gould-Fogerite, *BioTechniques* 6(7):

5   682 (1988); U.S. Pat No. 5,279,833; WO 91/06309; and Felgner, et al., *Proc. Nat'l Acad. Sci. USA* 84:7413 (1987). In addition, peptides and compounds referred to collectively as protective, interactive, non-condensing compounds (PINC) could also be complexed to purified plasmid DNA to influence variables such as stability, intramuscular dispersion, or trafficking to specific organs or cell types.

          Target cell sensitization can be used as a functional assay for expression and HLA class I

10   presentation of minigene-encoded CTL epitopes. For example, the plasmid DNA is introduced into a mammalian cell line that is suitable as a target for standard CTL chromium release assays. The transfection method used will be dependent on the final formulation. Electroporation can be used for "naked" DNA, whereas cationic lipids allow direct *in vitro* transfection. A plasmid expressing green fluorescent protein (GFP) can be co-transfected to allow enrichment of transfected cells using fluorescence activated cell

15   sorting (FACS). These cells are then chromium-51 (^{51}Cr) labeled and used as target cells for epitope-specific CTL lines; cytolysis, detected by ^{51}Cr release, indicates both production of, and HLA presentation of, minigene-encoded CTL epitopes. Expression of HTL epitopes may be evaluated in an analogous manner using assays to assess HTL activity.

          In vivo immunogenicity is a second approach for functional testing of minigene DNA

20   formulations. Transgenic mice expressing appropriate human HLA proteins are immunized with the DNA product. The dose and route of administration are formulation dependent (e.g., IM for DNA in PBS, intraperitoneal (i.p.) for lipid-complexed DNA). Twenty-one days after immunization, splenocytes are harvested and restimulated for one week in the presence of peptides encoding each epitope being tested. Thereafter, for CTL effector cells, assays are conducted for cytolysis of peptide-loaded, ^{51}Cr-labeled target

25   cells using standard techniques. Lysis of target cells that were sensitized by HLA loaded with peptide epitopes, corresponding to minigene-encoded epitopes, demonstrates DNA vaccine function for *in vivo* induction of CTLs. Immunogenicity of HTL epitopes is evaluated in transgenic mice in an analogous manner.

          Alternatively, the nucleic acids can be administered using ballistic delivery as described,

30   for instance, in U.S. Patent No. 5,204,253. Using this technique, particles comprised solely of DNA are administered. In a further alternative embodiment, DNA can be adhered to particles, such as gold particles.

          Minigenes can also be delivered using other bacterial or viral delivery systems well known in the art, e.g., an expression construct encoding epitopes of the invention can be incorporated into a viral vector such as vaccinia.

35

III.K.2. Combinations of CTL Peptides with Helper Peptides

          Vaccine compositions comprising CTL peptides of the invention can be modified to provide desired attributes, such as improved serum half life, broadened population coverage or enhanced immunogenicity.

For instance, the ability of a peptide to induce CTL activity can be enhanced by linking the peptide to a sequence which contains at least one epitope that is capable of inducing a T helper cell response. The use of T helper epitopes in conjunction with CTL epitopes to enhance immunogenicity is illustrated, for example, in the co-pending applications U.S.S.N. 08/820,360, U.S.S.N. 08/197,484, and

5   U.S.S.N. 08/464,234.

Although a CTL peptide can be directly linked to a T helper peptide, often CTL epitope/HTL epitope conjugates are linked by a spacer molecule. The spacer is typically comprised of relatively small, neutral molecules, such as amino acids or amino acid mimetics, which are substantially uncharged under physiological conditions. The spacers are typically selected from, e.g., Ala, Gly, or other

10   neutral spacers of nonpolar amino acids or neutral polar amino acids. It will be understood that the optionally present spacer need not be comprised of the same residues and thus may be a hetero- or homo-oligomer. When present, the spacer will usually be at least one or two residues, more usually three to six residues and sometimes 10 or more residues. The CTL peptide epitope can be linked to the T helper peptide epitope either directly or via a spacer either at the amino or carboxy terminus of the CTL peptide.

15   The amino terminus of either the immunogenic peptide or the T helper peptide may be acylated.

In certain embodiments, the T helper peptide is one that is recognized by T helper cells present in the majority of the population. This can be accomplished by selecting peptides that bind to many, most, or all of the HLA class II molecules. These are known as "loosely HLA-restricted" or "promiscuous" T helper sequences. Examples of amino acid sequences that are promiscuous include

20   sequences from antigens such as tetanus toxoid at positions 830-843 (QYIKANSKFIGITE; SEQ ID NO: 51484), *Plasmodium falciparum* circumsporozoite (CS) protein at positions 378-398 (DIEKKIAKMEKASSVFNVVNS; SEQ ID NO: 51485), and *Streptococcus* 18kD protein at positions 116 (GAVDSILGGVATYGAA; SEQ ID NO: 51486). Other examples include peptides bearing a DR 1-4-7 supermotif, or either of the DR3 motifs.

25   Alternatively, it is possible to prepare synthetic peptides capable of stimulating T helper lymphocytes, in a loosely HLA-restricted fashion, using amino acid sequences not found in nature (*see, e.g.*, PCT publication WO 95/07707). These synthetic compounds called Pan-DR-binding epitopes (*e.g.*, PADRE™, Epimmune, Inc., San Diego, CA) are designed to most preferably bind most HLA-DR (human HLA class II) molecules. For instance, a pan-DR-binding epitope peptide having the formula:

30   aKXVAAWTLKAAa, where "X" is either cyclohexylalanine, phenylalanine, or tyrosine, and a is either D-alanine or L-alanine, has been found to bind to most HLA-DR alleles, and to stimulate the response of T helper lymphocytes from most individuals, regardless of their HLA type. An alternative of a pan-DR binding epitope comprises all "L" natural amino acids and can be provided in the form of nucleic acids that encode the epitope.

35   HTL peptide epitopes can also be modified to alter their biological properties. For example, they can be modified to include D-amino acids to increase their resistance to proteases and thus extend their serum half life, or they can be conjugated to other molecules such as lipids, proteins, carbohydrates, and the like to increase their biological activity. For example, a T helper peptide can be conjugated to one or more palmitic acid chains at either the amino or carboxyl termini.

40

III.K.3. Combinations of CTL Peptides with T Cell Priming Agents

In some embodiments it may be desirable to include in the pharmaceutical compositions of the invention at least one component which primes cytotoxic T lymphocytes. Lipids have been identified as agents capable of priming CTL *in vivo* against viral antigens. For example, palmitic acid residues can be attached to the ε-and α- amino groups of a lysine residue and then linked, *e.g.,* via one or more linking residues such as Gly, Gly-Gly-, Ser, Ser-Ser, or the like, to an immunogenic peptide. The lipidated peptide can then be administered either directly in a micelle or particle, incorporated into a liposome, or emulsified in an adjuvant, *e.g.,* incomplete Freund's adjuvant. In a preferred embodiment, a particularly effective immunogenic composition comprises palmitic acid attached to ε- and α- amino groups of Lys, which is attached via linkage, *e.g.,* Ser-Ser, to the amino terminus of the immunogenic peptide.

As another example of lipid priming of CTL responses, *E. coli* lipoproteins, such as tripalmitoyl-S-glycerylcysteinlyseryl- serine (P₃CSS) can be used to prime virus specific CTL when covalently attached to an appropriate peptide (*see, e.g.,* Deres, *et al., Nature* 342:561, 1989). Peptides of the invention can be coupled to P₃CSS, for example, and the lipopeptide administered to an individual to specifically prime a CTL response to the target antigen. Moreover, because the induction of neutralizing antibodies can also be primed with P₃CSS-conjugated epitopes, two such compositions can be combined to more effectively elicit both humoral and cell-mediated responses.

CTL and/or HTL peptides can also be modified by the addition of amino acids to the termini of a peptide to provide for ease of linking peptides one to another, for coupling to a carrier support or larger peptide, for modifying the physical or chemical properties of the peptide or oligopeptide, or the like. Amino acids such as tyrosine, cysteine, lysine, glutamic or aspartic acid, or the like, can be introduced at the C- or N-terminus of the peptide or oligopeptide, particularly class I peptides. However, it is to be noted that modification at the carboxyl terminus of a CTL epitope may, in some cases, alter binding characteristics of the peptide. In addition, the peptide or oligopeptide sequences can differ from the natural sequence by being modified by terminal-NH₂ acylation, *e.g.,* by alkanoyl (C1-C20) or thioglycolyl acetylation, terminal-carboxyl amidation, *e.g.,* ammonia, methylamine, *etc.* In some instances these modifications may provide sites for linking to a support or other molecule.

IV.J.4. Vaccine Compositions Comprising DC Pulsed with CTL and/or HTL Peptides

An embodiment of a vaccine composition in accordance with the invention comprises *ex vivo* administration of a cocktail of epitope-bearing peptides to PBMC, or isolated DC therefrom, from the patient's blood. A pharmaceutical to facilitate harvesting of DC can be used, such as Progenipoietin (Monsanto, St. Louis, MO) or GM-CSF/IL-4. After pulsing the DC with peptides and prior to reinfusion into patients, the DC are washed to remove unbound peptides. In this embodiment, a vaccine comprises peptide-pulsed DCs which present the pulsed peptide epitopes complexed with HLA molecules on their surfaces.

The DC can be pulsed *ex vivo* with a cocktail of peptides, some of which stimulate CTL responses to one or more HPV antigens of interest. Optionally, a helper T cell (HTL) peptide such as a PADRE family molecule, can be included to facilitate the CTL response. Thus, a vaccine in accordance

with the invention, preferably comprising epitopes from multiple HPV antigens, is used to treat HPV
infection or cancer resulting from HPV infection.

III.L.   Administration of Vaccines for Therapeutic or Prophylactic Purposes

5   The peptides of the present invention and pharmaceutical and vaccine compositions of the
invention are typically used to treat and/or prevent cancer associated with HPV infection. Vaccine
compositions containing the peptides of the invention are administered to a patient infected with HPV or to
an individual susceptible to, or otherwise at risk for, HPV infection to elicit an immune response against
HPV antigens and thus enhance the patient's own immune response capabilities.

10   As noted above, peptides comprising CTL and/or HTL epitopes of the invention induce
immune responses when presented by HLA molecules and contacted with a CTL or HTL specific for an
epitope comprised by the peptide. The peptides (or DNA encoding them) can be administered individually
or as fusions of one or more peptide sequences. The manner in which the peptide is contacted with the CTL
or HTL is not critical to the invention. For instance, the peptide can be contacted with the CTL or HTL

15   either *in vivo* or *in vitro*. If the contacting occurs *in vivo*, the peptide itself can be administered to the
patient, or other vehicles, *e.g.*, DNA vectors encoding one or more peptides, viral vectors encoding the
peptide(s), liposomes and the like, can be used, as described herein.

              When the peptide is contacted *in vitro*, the vaccinating agent can comprise a population of
cells, *e.g.*, peptide-pulsed dendritic cells, or HPV-specific CTLs, which have been induced by pulsing

20   antigen-presenting cells *in vitro* with the peptide or by transfecting antigen-presenting cells with a minigene
of the invention. Such a cell population is subsequently administered to a patient in a therapeutically
effective dose.

              In therapeutic applications, peptide and/or nucleic acid compositions are administered to a
patient in an amount sufficient to elicit an effective CTL and/or HTL response to the virus antigen and to

25   cure or at least partially arrest or slow symptoms and/or complications. An amount adequate to accomplish
this is defined as "therapeutically effective dose." Amounts effective for this use will depend on, *e.g.*, the
particular composition administered, the manner of administration, the stage and severity of the disease
being treated, the weight and general state of health of the patient, and the judgment of the prescribing
physician.

30   For pharmaceutical compositions, the immunogenic peptides of the invention, or DNA
encoding them, are generally administered to an individual already infected with HPV. The peptides or
DNA encoding them can be administered individually or as fusions of one or more peptide sequences.
HPV-infected patients, with or without neoplasia, can be treated with the immunogenic peptides separately
or in conjunction with other treatments, such as surgery, as appropriate.

35   For therapeutic use, administration should generally begin at the first diagnosis of HPV
infection or HPV-associated cancer. This is followed by boosting doses until at least symptoms are
substantially abated and for a period thereafter. The embodiment of the vaccine composition (*i.e.*,
including, but not limited to embodiments such as peptide cocktails, polyepitopic polypeptides, minigenes,
or TAA-specific CTLs or pulsed dendritic cells) delivered to the patient may vary according to the stage of

40   the disease or the patient's health status. For example, in a patient with a tumor that expresses HPV

antigens, a vaccine comprising HPV-specific CTL may be more efficacious in killing tumor cells in patient
with advanced disease than alternative embodiments.

Where susceptible individuals are identified prior to or during infection, the composition
can be targeted to them, thus minimizing the need for administration to a larger population. Susceptible
populations include those individuals who are sexually active.

The peptide or other compositions used for the treatment or prophylaxis of HPV infection
can be used, e.g., in persons who have not manifested symptoms, e.g., genital warts or neoplastic growth.
In this context, it is generally important to provide an amount of the peptide epitope delivered by a mode of
administration sufficient to effectively stimulate a cytotoxic T cell response; compositions which stimulate
helper T cell responses can also be given in accordance with this embodiment of the invention.

The dosage for an initial therapeutic immunization generally occurs in a unit dosage range
where the lower value is about 1, 5, 50, 500, or 1,000 µg and the higher value is about 10,000; 20,000;
30,000; or 50,000 µg. Dosage values for a human typically range from about 500 µg to about 50,000 µg per
70 kilogram patient. Boosting dosages of between about 1.0 µg to about 50,000 µg of peptide pursuant to a
boosting regimen over weeks to months may be administered depending upon the patient's response and
condition as determined by measuring the specific activity of CTL and HTL obtained from the patient's
blood. Administration should continue until at least clinical symptoms or laboratory tests indicate that the
viral infection, or neoplasia, has been eliminated or reduced and for a period thereafter. The dosages, routes
of administration, and dose schedules are adjusted in accordance with methodologies known in the art.

In certain embodiments, the peptides and compositions of the present invention are
employed in serious disease states, that is, life-threatening or potentially life threatening situations. In such
cases, as a result of the minimal amounts of extraneous substances and the relative nontoxic nature of the
peptides in preferred compositions of the invention, it is possible and may be felt desirable by the treating
physician to administer substantial excesses of these peptide compositions relative to these stated dosage
amounts.

The vaccine compositions of the invention can also be used purely as prophylactic agents.
Generally the dosage for an initial prophylactic immunization generally occurs in a unit dosage range where
the lower value is about 1, 5, 50, 500, or 1000 µg and the higher value is about 10,000; 20,000; 30,000; or
50,000 µg. Dosage values for a human typically range from about 500 µg to about 50,000 µg per 70
kilogram patient. This is followed by boosting dosages of between about 1.0 µg to about 50,000 µg of
peptide administered at defined intervals from about four weeks to six months after the initial
administration of vaccine. The immunogenicity of the vaccine can be assessed by measuring the specific
activity of CTL and HTL obtained from a sample of the patient's blood.

The pharmaceutical compositions for therapeutic treatment are intended for parenteral,
topical, oral, intrathecal, or local (e.g. as a cream or topical ointment) administration. Preferably, the
pharmaceutical compositions are administered parentally, e.g., intravenously, subcutaneously,
intradermally, or intramuscularly. Thus, the invention provides compositions for parenteral administration
which comprise a solution of the immunogenic peptides dissolved or suspended in an acceptable carrier,
preferably an aqueous carrier. A variety of aqueous carriers may be used, e.g., water, buffered water, 0.8%
saline, 0.3% glycine, hyaluronic acid and the like. These compositions may be sterilized by conventional,

well known sterilization techniques, or may be sterile filtered. The resulting aqueous solutions may be packaged for use as is, or lyophilized, the lyophilized preparation being combined with a sterile solution prior to administration. The compositions may contain pharmaceutically acceptable auxiliary substances as required to approximate physiological conditions, such as pH-adjusting and buffering agents, tonicity

5   adjusting agents, wetting agents, preservatives, and the like, for example, sodium acetate, sodium lactate, sodium chloride, potassium chloride, calcium chloride, sorbitan monolaurate, triethanolamine oleate, *etc.*

The concentration of peptides of the invention in the pharmaceutical formulations can vary widely, *i.e.,* from less than about 0.1%, usually at or at least about 2% to as much as 20% to 50% or more by weight, and will be selected primarily by fluid volumes, viscosities, *etc.*, in accordance with the

10   particular mode of administration selected.

A human unit dose form of the peptide composition is typically included in a pharmaceutical composition that comprises a human unit dose of an acceptable carrier, preferably an aqueous carrier, and is administered in a volume of fluid that is known by those of skill in the art to be used for administration of such compositions to humans (*see, e.g.,* Remington's Pharmaceutical Sciences, 17th

15   Edition, A. Gennaro, Editor, Mack Publishing Co., Easton, Pennsylvania, 1985).

The peptides of the invention, and/or nucleic acids encoding the peptides, can also be administered via liposomes, which may also serve to target the peptides to a particular tissue, such as lymphoid tissue, or to target selectively to infected cells, as well as to increase the half-life of the peptide composition. Liposomes include emulsions, foams, micelles, insoluble monolayers, liquid crystals,

20   phospholipid dispersions, lamellar layers and the like. In these preparations, the peptide to be delivered is incorporated as part of a liposome, alone or in conjunction with a molecule which binds to a receptor prevalent among lymphoid cells, such as monoclonal antibodies which bind to the CD45 antigen, or with other therapeutic or immunogenic compositions. Thus, liposomes either filled or decorated with a desired peptide of the invention can be directed to the site of lymphoid cells, where the liposomes then deliver the

25   peptide compositions. Liposomes for use in accordance with the invention are formed from standard vesicle-forming lipids, which generally include neutral and negatively charged phospholipids and a sterol, such as cholesterol. The selection of lipids is generally guided by consideration of, *e.g.,* liposome size, acid lability and stability of the liposomes in the blood stream. A variety of methods are available for preparing liposomes, as described in, *e.g.,* Szoka, *et al., Ann. Rev. Biophys. Bioeng.* 9:467 (1980), and U.S. Patent

30   Nos. 4,235,871, 4,501,728, 4,837,028, and 5,019,369.

For targeting cells of the immune system, a ligand to be incorporated into the liposome can include, *e.g.,* antibodies or fragments thereof specific for cell surface determinants of the desired immune system cells. A liposome suspension containing a peptide may be administered intravenously, locally, topically, *etc.* in a dose which varies according to, *inter alia,* the manner of administration, the

35   peptide being delivered, and the stage of the disease being treated.

For solid compositions, conventional nontoxic solid carriers may be used which include, for example, pharmaceutical grades of mannitol, lactose, starch, magnesium stearate, sodium saccharin, talcum, cellulose, glucose, sucrose, magnesium carbonate, and the like. For oral administration, a pharmaceutically acceptable nontoxic composition is formed by incorporating any of the normally

employed excipients, such as those carriers previously listed, and generally 10-95% of active ingredient, that is, one or more peptides of the invention, and more preferably at a concentration of 25%-75%.

For aerosol administration, the immunogenic peptides are preferably supplied in finely divided form along with a surfactant and propellant. Typical percentages of peptides are 0.01%-20% by

5   weight, preferably 1%-10%. The surfactant must, of course, be nontoxic, and preferably soluble in the propellant. Representative of such agents are the esters or partial esters of fatty acids containing from 6 to 22 carbon atoms, such as caproic, octanoic, lauric, palmitic, stearic, linoleic, linolenic, olesteric and oleic acids with an aliphatic polyhydric alcohol or its cyclic anhydride. Mixed esters, such as mixed or natural glycerides may be employed. The surfactant may constitute 0.1%-20% by weight of the composition,

10   preferably 0.25-5%. The balance of the composition is ordinarily propellant. A carrier can also be included, as desired, as with, *e.g.*, lecithin for intranasal delivery.

III.M. HLA EXPRESSION: IMPLICATIONS FOR T CELL-BASED IMMUNOTHERAPY

Disease progression in cancer and infectious disease

15   It is well recognized that a dynamic interaction between exists between host and disease, both in the cancer and infectious disease settings. In the infectious disease setting, it is well established that pathogens evolve during disease. The strains that predominate early in HIV infection are different from the ones that are associated with AIDS and later disease stages (NS versus S strains). It has long been hypothesized that pathogen forms that are effective in establishing infection may differ from the ones most

20   effective in terms of replication and chronicity.

Similarly, it is widely recognized that the pathological process by which an individual succumbs to a neoplastic disease is complex. During the course of disease, many changes occur in cancer cells. The tumor accumulates alterations which are in part related to dysfunctional regulation of growth and differentiation, but also related to maximizing its growth potential, escape from drug treatment and/or the

25   body's immunosurveillance. Neoplastic disease results in the accumulation of several different biochemical alterations of cancer cells, as a function of disease progression. It also results in significant levels of intra- and inter- cancer heterogeneity, particularly in the late, metastatic stage.

Familiar examples of cellular alterations affecting treatment outcomes include the outgrowth of radiation or chemotherapy resistant tumors during the course of therapy. These examples

30   parallel the emergence of drug resistant viral strains as a result of aggressive chemotherapy, *e.g.*, of chronic HBV and HIV infection, and the current resurgence of drug resistant organisms that cause Tuberculosis and Malaria. It appears that significant heterogeneity of responses is also associated with other approaches to cancer therapy, including anti-angiogenesis drugs, passive antibody immunotherapy, and active T cell-based immunotherapy. Thus, in view of such phenomena, epitopes from multiple disease-related antigens

35   can be used in vaccines and therapeutics thereby counteracting the ability of diseased cells to mutate and escape treatment.

The interplay between disease and the immune system

One of the main factors contributing to the dynamic interplay between host and disease is

40   the immune response mounted against the pathogen, infected cell, or malignant cell. In many conditions

such immune responses control the disease. Several animal model systems and prospective studies of natural infection in humans suggest that immune responses against a pathogen can control the pathogen, prevent progression to severe disease and/or eliminate the pathogen. A common theme is the requirement for a multispecific T cell response, and narrowly focused responses appear to be less effective. These

5   observations guide skilled artisan as to embodiments of methods and compositions of the present invention that provide for a broad immune response.

In the cancer setting there are several findings that indicate that immune responses can impact neoplastic growth:

First, the demonstration in many different animal models, that anti-tumor T cells,

10   restricted by MHC class I, can prevent or treat tumors.

Second, encouraging results have come from immunotherapy trials.

Third, observations made in the course of natural disease correlated the type and composition of T cell infiltrate within tumors with positive clinical outcomes (Coulie PG, *et al.* Antitumor immunity at work in a melanoma patient In *Advances in Cancer Research*, 213-242, 1999).

15   Finally, tumors commonly have the ability to mutate, thereby changing their immunological recognition. For example, the presence of monospecific CTL was also correlated with control of tumor growth, until antigen loss emerged (Riker A, *et al.*, Immune selection after antigen-specific immunotherapy of melanoma *Surgery*, Aug: 126(2):112-20, 1999; Marchand M, *et al.*, Tumor regressions observed in patients with metastatic melanoma treated with an antigenic peptide encoded by gene MAGE-3

20   and presented by HLA-A1 *Int. J. Cancer* 80(2):219-30, Jan. 18, 1999). Similarly, loss of beta 2 microglobulin was detected in 5/13 lines established from melanoma patients after receiving immunotherapy at the NCI (Restifo NP, *et al.*, Loss of functional Beta2 - microglobulin in metastatic melanomas from five patients receiving immunotherapy *Journal of the National Cancer Institute*, Vol. 88 (2), 100-108, Jan. 1996). It has long been recognized that HLA class I is frequently altered in various

25   tumor types. This has led to a hypothesis that this phenomenon might reflect immune pressure exerted on the tumor by means of class I restricted CTL. The extent and degree of alteration in HLA class I expression appears to be reflective of past immune pressures, and may also have prognostic value (van Duinen SG, *et al.*, Level of HLA antigens in locoregional metastases and clinical course of the disease in patients with melanoma *Cancer Research* 48, 1019-1025, Feb. 1988; Möller P, *et al.*, Influence of major

30   histocompatibility complex class I and II antigens on survival in colorectal carcinoma *Cancer Research* 51, 729-736, Jan. 1991). Taken together, these observations provide a rationale for immunotherapy of cancer and infectious disease, and suggest that effective strategies need to account for the complex series of pathological changes associated with disease.

35   The three main types of alterations in HLA expression in tumors and their functional significance

The level and pattern of expression of HLA class I antigens in tumors has been studied in many different tumor types and alterations have been reported in all types of tumors studied. The molecular mechanisms underlining HLA class I alterations have been demonstrated to be quite heterogeneous. They include alterations in the TAP/processing pathways, mutations of β2-microglobulin and specific HLA

40   heavy chains, alterations in the regulatory elements controlling over class I expression and loss of entire

chromosome sections. There are several reviews on this topic, *see, e.g.,* : Garrido F, *et al.*, Natural history of HLA expression during tumour development *Immunol Today* 14(10):491-499, 1993; Kaklamanis L, *et al.*, Loss of HLA class-I alleles, heavy chains and β2-microglobulin in colorectal cancer *Int. J. Cancer,* 51(3):379-85, May 28,1992. There are three main types of HLA Class I alteration (complete loss, allele-

5   specific loss and decreased expression). The functional significance of each alteration is discussed separately:

Complete loss of HLA expression

                Complete loss of HLA expression can result from a variety of different molecular
10   mechanisms, reviewed in (Algarra I, *et al.*, The HLA crossroad in tumor immunology *Human Immunology* 61, 65-73, 2000; Browning M, *et al.*, Mechanisms of loss of HLA class I expression on colorectal tumor cells *Tissue Antigens* 47:364-371, 1996; Ferrone S, et al., Loss of HLA class I antigens by melanoma cells: molecular mechanisms, functional significance and clinical relevance *Immunology Today*, 16(10): 487-494, 1995; Garrido F, *et al.*, Natural history of HLA expression during tumour development *Immunology Today*
15   14(10):491-499, 1993; Tait, BD, HLA Class I expression on human cancer cells: Implications for effective immunotherapy *Hum Immunol* 61, 158-165, 2000). In functional terms, this type of alteration has several important implications.

                While the complete absence of class I expression will eliminate CTL recognition of those tumor cells, the loss of HLA class I will also render the tumor cells extraordinary sensitive to lysis from NK
20   cells (Ohnmacht, GA, *et al.*, Heterogeneity in expression of human leukocyte antigens and melanoma-associated antigens in advanced melanoma *J Cellular Phys* 182:332-338, 2000; Liunggren HG, *et al.*, Host resistance directed selectively against H-2 deficient lymphoma variants: Analysis of the mechanism *J. Exp. Med.*, Dec 1;162(6):1745-59, 1985; Maio M, *et al.*, Reduction in susceptibility to natural killer cell-mediated lysis of human FO-1 melanoma cells after induction of HLA class I antigen expression by
25   transfection with B2m gene *J. Clin. Invest.* 88(1):282-9, July 1991; Schrier PI, *et al.*, Relationship between myc oncogene activation and MHC class I expression *Adv. Cancer Res.*, 60:181-246, 1993).

                The complementary interplay between loss of HLA expression and gain in NK sensitivity is exemplified by the classic studies of Coulie and coworkers (Coulie, PG, *et al.*, Antitumor immunity at work in a melanoma patient. In *Advances in Cancer Research*, 213-242, 1999) which described the
30   evolution of a patient's immune response over the course of several years. Because of increased sensitivity to NK lysis, it is predicted that approaches leading to stimulation of innate immunity in general and NK activity in particular would be of special significance. An example of such approach is the induction of large amounts of dendritic cells (DC) by various hematopoietic growth factors, such as Flt3 ligand or ProGP. The rationale for this approach resides in the well known fact that dendritic cells produce large
35   amounts of IL-12, one of the most potent stimulators for innate immunity and NK activity in particular. Alternatively, IL-12 is administered directly, or as nucleic acids that encode it. In this light, it is interesting to note that Flt3 ligand treatment results in transient tumor regression of a class I negative prostate murine cancer model (Ciavarra RP, *et al.*, Flt3-Ligand induces transient tumor regression in an ectopic treatment model of major histocompatibility complex-negative prostate cancer *Cancer Res* 60:2081-84, 2000). In this
40   context, specific anti-tumor vaccines in accordance with the invention synergize with these types of

hematopoietic growth factors to facilitate both CTL and NK cell responses, thereby appreciably impairing a cell's ability to mutate and thereby escape efficacious treatment. Thus, an embodiment of the present invention comprises a composition of the invention together with a method or composition that augments functional activity or numbers of NK cells. Such an embodiment can comprise a protocol that provides a
5   composition of the invention sequentially with an NK-inducing modality, or contemporaneous with an NK-inducing modality.

Secondly, complete loss of HLA frequently occurs only in a fraction of the tumor cells, while the remainder of tumor cells continue to exhibit normal expression. In functional terms, the tumor would still be subject, in part, to direct attack from a CTL response; the portion of cells lacking HLA
10 subject to an NK response. Even if only a CTL response were used, destruction of the HLA expressing fraction of the tumor has dramatic effects on survival times and quality of life.

It should also be noted that in the case of heterogeneous HLA expression, both normal HLA-expressing as well as defective cells are predicted to be susceptible to immune destruction based on "bystander effects." Such effects were demonstrated, e.g., in the studies of Rosendahl and colleagues that
15 investigated in vivo mechanisms of action of antibody targeted superantigens (Rosendahl A, *et al.*, Perforin and IFN-gamma are involved in the antitumor effects of antibody-targeted superantigens *J. Immunol.* 160(11):5309-13, June 1, 1998). The bystander effect is understood to be mediated by cytokines elicited from, *e.g.*, CTLs acting on an HLA-bearing target cell, whereby the cytokines are in the environment of other diseased cells that are concomitantly killed.

20
Allele-specific loss

One of the most common types of alterations in class I molecules is the selective loss of certain alleles in individuals heterozygous for HLA. Allele-specific alterations might reflect the tumor adaptation to immune pressure, exerted by an immunodominant response restricted by a single HLA
25 restriction element. This type of alteration allows the tumor to retain class I expression and thus escape NK cell recognition, yet still be susceptible to a CTL-based vaccine in accordance with the invention which comprises epitopes corresponding to the remaining HLA type. Thus, a practical solution to overcome the potential hurdle of allele-specific loss relies on the induction of multispecific responses. Just as the inclusion of multiple disease-associated antigens in a vaccine of the invention guards against mutations that
30 yield loss of a specific disease antigens, simultaneously targeting multiple HLA specificities and multiple disease-related antigens prevents disease escape by allele-specific losses.

Decrease in expression (allele-specific or not)

The sensitivity of effector CTL has long been demonstrated (Brower, RC, *et al.*, Minimal
35 requirements for peptide mediated activation of CD8+ CTL *Mol. Immunol.*, 31;1285-93, 1994; Chriustnick, ET, *et al.* Low numbers of MHC class I-peptide complexes required to trigger a T cell response *Nature* 352:67-70, 1991; Sykulev, Y, *et al.*, Evidence that a single peptide-MHC complex on a target cell can elicit a cytolytic T cell response *Immunity*, 4(6):565-71, June 1996). Even a single peptide/MHC complex can result in tumor cells lysis and release of anti-tumor lymphokines. The biological significance of decreased
40 HLA expression and possible tumor escape from immune recognition is not fully known. Nevertheless, it

has been demonstrated that CTL recognition of as few as one MHC/peptide complex is sufficient to lead to tumor cell lysis.

    Further, it is commonly observed that expression of HLA can be upregulated by gamma IFN, commonly secreted by effector CTL. Additionally, HLA class I expression can be induced in vivo by
5   both alpha and beta IFN (Halloran, *et al.* Local T cell responses induce widespread MHC expression. *J Immunol* 148:3837, 1992; Pestka, S, *et al.*, Interferons and their actions *Annu. Rev. Biochem.* 56:727-77, 1987). Conversely, decreased levels of HLA class I expression also render cells more susceptible to NK lysis.

    With regard to gamma IFN, Torres et al (Torres, MJ, *et al.*, Loss of an HLA haplotype in
10 pancreas cancer tissue and its corresponding tumor derived cell line. *Tissue Antigens* 47:372-81, 1996) note that HLA expression is upregulated by gamma IFN in pancreatic cancer, unless a total loss of haplotype has occurred. Similarly, Rees and Mian note that allelic deletion and loss can be restored, at least partially, by cytokines such as IFN-gamma (Rees, R., *et al.* Selective MHC expression in tumours modulates adaptive and innate antitumour responses *Cancer Immunol Immunother* 48:374-81, 1999). It has also been noted
15 that IFN-gamma treatment results in upregulation of class I molecules in the majority of the cases studied (Browning M, *et al.*, Mechanisms of loss of HLA class I expression on colorectal tumor cells. *Tissue Antigens* 47:364-71, 1996). Kaklamakis, et al. also suggested that adjuvant immunotherapy with IFN-gamma may be beneficial in the case of HLA class I negative tumors (Kaklamanis L, Loss of transporter in antigen processing 1 transport protein and major histocompatibility complex class I molecules in metastatic
20 versus primary breast cancer. *Cancer Research* 55:5191-94, November 1995). It is important to underline that IFN-gamma production is induced and self-amplified by local inflammation/immunization (Halloran, *et al.* Local T cell responses induce widespread MHC expression *J. Immunol* 148:3837, 1992), resulting in large increases in MHC expressions even in sites distant from the inflammatory site.

    Finally, studies have demonstrated that decreased HLA expression can render tumor cells
25 more susceptible to NK lysis (Ohnmacht, GA, *et al.*, Heterogeneity in expression of human leukocyte antigens and melanoma-associated antigens in advanced melanoma *J Cellular Phys* 182:332-38, 2000; Liunggren HG, *et al.*, Host resistance directed selectively against H-2 deficient lymphoma variants: Analysis of the mechanism *J. Exp. Med.*, 162(6):1745-59, December 1, 1985; Maio M, *et al.*, Reduction in susceptibility to natural killer cell-mediated lysis of human FO-1 melanoma cells after induction of HLA
30 class I antigen expression by transfection with β2m gene *J. Clin. Invest.* 88(1):282-9, July 1991; Schrier PI, *et al.*, Relationship between myc oncogene activation and MHC class I expression *Adv. Cancer Res.*, 60:181-246, 1993). If decreases in HLA expression benefit a tumor because it facilitates CTL escape, but render the tumor susceptible to NK lysis, then a minimal level of HLA expression that allows for resistance to NK activity would be selected for (Garrido F, *et al.*, Implications for immunosurveillance of altered HLA
35 class I phenotypes in human tumours *Immunol Today* 18(2):89-96, February 1997). Therefore, a therapeutic compositions or methods in accordance with the invention together with a treatment to upregulate HLA expression and/or treatment with high affinity T-cells renders the tumor sensitive to CTL destruction.

Frequency of alterations in HLA expression

The frequency of alterations in class I expression is the subject of numerous studies (Algarra I, *et al.*, The HLA crossroad in tumor immunology *Human Immunology* 61, 65-73, 2000). Rees and Mian estimate allelic loss to occur overall in 3-20% of tumors, and allelic deletion to occur in 15-50%

5   of tumors. It should be noted that each cell carries two separate sets of class I genes, each gene carrying one HLA-A and one HLA-B locus. Thus, fully heterozygous individuals carry two different HLA-A molecules and two different HLA-B molecules. Accordingly, the actual frequency of losses for any specific allele could be as little as one quarter of the overall frequency. They also note that, in general, a gradient of expression exists between normal cells, primary tumors and tumor metastasis. In a study from

10   Natali and coworkers (Natali PG, *et al.*, Selective changes in expression of HLA class I polymorphic determinants in human solid tumors *PNAS USA* 86:6719-6723, September 1989), solid tumors were investigated for total HLA expression, using W6/32 antibody, and for allele-specific expression of the A2 antigen, as evaluated by use of the BB7.2 antibody. Tumor samples were derived from primary cancers or metastasis, for 13 different tumor types, and scored as negative if less than 20%, reduced if in the 30-80%

15   range, and normal above 80%. All tumors, both primary and metastatic, were HLA positive with W6/32. In terms of A2 expression, a reduction was noted in 16.1 % of the cases, and A2 was scored as undetectable in 39.4 % of the cases. Garrido and coworkers (Garrido F, *et al.*, Natural history of HLA expression during tumour development *Immunol Today* 14(10):491-99, 1993) emphasize that HLA changes appear to occur at a particular step in the progression from benign to most aggressive. Jiminez *et al* (Jiminez P, *et al.*,

20   Microsatellite instability analysis in tumors with different mechanisms for total loss of HLA expression. *Cancer Immunol* Immunother 48:684-90, 2000) have analyzed 118 different tumors (68 colorectal, 34 laryngeal and 16 melanomas). The frequencies reported for total loss of HLA expression were 11% for colon, 18% for melanoma and 13 % for larynx. Thus, HLA class I expression is altered in a significant fraction of the tumor types, possibly as a reflection of immune pressure, or simply a reflection of the

25   accumulation of pathological changes and alterations in diseased cells.

Immunotherapy in the context of HLA loss

A majority of the tumors express HLA class I, with a general tendency for the more severe alterations to be found in later stage and less differentiated tumors. This pattern is encouraging in

30   the context of immunotherapy, especially considering that: 1) the relatively low sensitivity of immunohistochemical techniques might underestimate HLA expression in tumors; 2) class I expression can be induced in tumor cells as a result of local inflammation and lymphokine release; and, 3) class I negative cells are sensitive to lysis by NK cells.

A ccordingly, various embodiments of the present invention can be selected in view of the

35   fact that there can be a degree of loss of HLA molecules, particularly in the context of neoplastic disease. For example, the treating physician can assay a patient's tumor to ascertain whether HLA is being expressed. If a percentage of tumor cells express no class I HLA, then embodiments of the present invention that comprise methods or compositions that elicit NK cell responses can be employed. As noted herein, such NK-inducing methods or composition can comprise a Flt3 ligand or ProGP which facilitate

40   mobilization of dendritic cells, the rationale being that dendritic cells produce large amounts of IL-12. IL-

12 can also be administered directly in either amino acid or nucleic acid form. It should be noted that compositions in accordance with the invention can be administered concurrently with NK cell-inducing compositions, or these compositions can be administered sequentially.

5   In the context of allele-specific HLA loss, a tumor retains class I expression and may thus escape NK cell recognition, yet still be susceptible to a CTL-based vaccine in accordance with the invention which comprises epitopes corresponding to the remaining HLA type. The concept here is analogous to embodiments of the invention that include multiple disease antigens to guard against mutations that yield loss of a specific antigen. Thus, one can simultaneously target multiple HLA specificities and epitopes from multiple disease-related antigens to prevent tumor escape by allele-specific loss as well as disease-

10   related antigen loss. In addition, embodiments of the present invention can be combined with alternative therapeutic compositions and methods. Such alternative compositions and methods comprise, without limitation, radiation, cytotoxic pharmaceuticals, and/or compositions/methods that induce humoral antibody responses.

      Moreover, it has been observed that expression of HLA can be upregulated by gamma

15   IFN, which is commonly secreted by effector CTL, and that HLA class I expression can be induced in vivo by both alpha and beta IFN. Thus, embodiments of the invention can also comprise alpha, beta and/or gamma IFN to facilitate upregualtion of HLA.

III.N. REPRIEVE PERIODS FROM THERAPIES THAT INDUCE SIDE EFFECTS: "Scheduled
20   **Treatment Interruptions or Drug Holidays"**

      Recent evidence has shown that certain patients infected with a pathogen, whom are initially treated with a therapeutic regimen to reduce pathogen load, have been able to maintain decreased pathogen load when removed from the therapeutic regimen, i.e., during a "drug holiday" (Rosenberg, E., *et al.*, Immune control of HIV-1 after early treatment of acute infection Nature 407:523-26, Sept. 28, 2000)

25   As appreciated by those skilled in the art, many therapeutic regimens for both pathogens and cancer have numerous, often severe, side effects. During the drug holiday, the patient's immune system is keeping the disease in check. Methods for using compositions of the invention are used in the context of drug holidays for cancer and pathogenic infection.

      For treatment of an infection, where therapies are not particularly immunosuppressive,

30   compositions of the invention are administered concurrently with the standard therapy. During this period, the patient's immune system is directed to induce responses against the epitopes comprised by the present inventive compositions. Upon removal from the treatment having side effects, the patient is primed to respond to the infectious pathogen should the pathogen load begin to increase. Composition of the invention can be provided during the drug holiday as well.

35   For patients with cancer, many therapies are immunosuppressive. Thus, upon achievement of a remission or identification that the patient is refractory to standard treatment, then upon removal from the immunosuppressive therapy, a composition in accordance with the invention is administered. Accordingly, as the patient's immune system reconstitutes, precious immune resources are simultaneously directed against the cancer. Composition of the invention can also be administered concurrently with an

40   immunosuppressive regimen if desired.

III.O. Kits

        The peptide and nucleic acid compositions of this invention can be provided in kit form together with instructions for vaccine administration. Typically the kit would include desired peptide

5   compositions in a container, preferably in unit dosage form and instructions for administration. An alternative kit would include a minigene construct with desired nucleic acids of the invention in a container, preferably in unit dosage form together with instructions for administration. Lymphokines such as IL-2 or IL-12 may also be included in the kit. Other kit components that may also be desirable include, for example, a sterile syringe, booster dosages, and other desired excipients.

10

III.P. Overview

        Epitopes in accordance with the present invention were successfully used to induce an immune response. Immune responses with these epitopes have been induced by administering the epitopes in various forms. The epitopes have been administered as peptides, as nucleic acids, and as viral vectors

15   comprising nucleic acids that encode the epitope(s) of the invention. Upon administration of peptide-based epitope forms, immune responses have been induced by direct loading of an epitope onto an empty HLA molecule that is expressed on a cell, and via internalization of the epitope and processing via the HLA class I pathway; in either event, the HLA molecule expressing the epitope was then able to interact with and induce a CTL response. Peptides can be delivered directly or using such agents as liposomes. They can

20   additionally be delivered using ballistic delivery, in which the peptides are typically in a crystalline form. When DNA is used to induce an immune response, it is administered either as naked DNA, generally in a dose range of approximately 1-5mg, or via the ballistic "gene gun" delivery, typically in a dose range of approximately 10-100 µg. The DNA can be delivered in a variety of conformations, *e.g.*, linear, circular *etc*. Various viral vectors have also successfully been used that comprise nucleic acids which encode

25   epitopes in accordance with the invention.

        Accordingly compositions in accordance with the invention exist in several forms. Embodiments of each of these composition forms in accordance with the invention have been successfully used to induce an immune response.

        One composition in accordance with the invention comprises a plurality of peptides. This

30   plurality or cocktail of peptides is generally admixed with one or more pharmaceutically acceptable excipients. The peptide cocktail can comprise multiple copies of the same peptide or can comprise a mixture of peptides. The peptides can be analogs of naturally occurring epitopes. The peptides can comprise artificial amino acids and/or chemical modifications such as addition of a surface active molecule, *e.g.*, lipidation; acetylation, glycosylation, biotinylation, phosphorylation etc. The peptides can be CTL or

35   HTL epitopes. In a preferred embodiment the peptide cocktail comprises a plurality of different CTL epitopes and at least one HTL epitope. The HTL epitope can be naturally or non-naturally (*e.g.*, PADRE®, Epimmune Inc., San Diego, CA). The number of distinct epitopes in an embodiment of the invention is generally a whole unit integer from one through one hundred fifty (e.g., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41,

40   42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70,

71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, or 150).

          An additional embodiment of a composition in accordance with the invention comprises a polypeptide multi-epitope construct, *i.e.*, a polyepitopic peptide. Polyepitopic peptides in accordance with
5   the invention are prepared by use of technologies well-known in the art. By use of these known technologies, epitopes in accordance with the invention are connected one to another. The polyepitopic peptides can be linear or non-linear, *e.g.*, multivalent. These polyepitopic constructs can comprise artificial amino acids, spacing or spacer amino acids, flanking amino acids, or chemical modifications between adjacent epitope units. The polyepitopic construct can be a heteropolymer or a homopolymer. The
10   polyepitopic constructs generally comprise epitopes in a quantity of any whole unit integer between 2-150 (*e.g.*, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, or 150). The polyepitopic construct can comprise CTL and/or
15   HTL epitopes. One or more of the epitopes in the construct can be modified, *e.g.*, by addition of a surface active material, *e.g.* a lipid, or chemically modified, *e.g.*, acetylation, *etc.* Moreover, bonds in the multiepitopic construct can be other than peptide bonds, *e.g.*, covalent bonds, ester or ether bonds, disulfide bonds, hydrogen bonds, ionic bonds *etc.*

          Alternatively, a composition in accordance with the invention comprises construct which
20   comprises a series, sequence, stretch, *etc.*, of amino acids that have homology to (*i.e.*, corresponds to or is contiguous with) to a native sequence. This stretch of amino acids comprises at least one subsequence of amino acids that, if cleaved or isolated from the longer series of amino acids, functions as an HLA class I or HLA class II epitope in accordance with the invention. In this embodiment, the peptide sequence is modified, so as to become a construct as defined herein, by use of any number of techniques known or to be
25   provided in the art. The polyepitopic constructs can contain homology to a native sequence in any whole unit integer increment from 70-100%, e.g., 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, or, 100 percent.

          A further embodiment of a composition in accordance with the invention is an antigen presenting cell that comprises one or more epitopes in accordance with the invention. The antigen
30   presenting cell can be a "professional" antigen presenting cell, such as a dendritic cell. The antigen presenting cell can comprise the epitope of the invention by any means known or to be determined in the art. Such means include pulsing of dendritic cells with one or more individual epitopes or with one or more peptides that comprise multiple epitopes, by nucleic acid administration such as ballistic nucleic acid delivery or by other techniques in the art for administration of nucleic acids, including vector-based, *e.g.*
35   viral vector, delivery of nucleic acids.

          Further embodiments of compositions in accordance with the invention comprise nucleic acids that encode one or more peptides of the invention, or nucleic acids which encode a polyepitopic peptide in accordance with the invention. As appreciated by one of ordinary skill in the art, various nucleic acids compositions will encode the same peptide due to the redundancy of the genetic code. Each of these
40   nucleic acid compositions falls within the scope of the present invention. This embodiment of the invention

comprises DNA or RNA, and in certain embodiments a combination of DNA and RNA. It is to be appreciated that any composition comprising nucleic acids that will encode a peptide in accordance with the invention or any other peptide based composition in accordance with the invention, falls within the scope of this invention.

5   It is to be appreciated that peptide-based forms of the invention (as well as the nucleic acids that encode them) can comprise analogs of epitopes of the invention generated using principles already known, or to be known, in the art. Principles related to analoging are now known in the art, and are disclosed herein; moreover, analoging principles (heteroclitic analoging) are disclosed in co-pending application serial number U.S.S.N. 09/226,775 filed 6 January 1999. Generally the compositions of the 10   invention are isolated or purified.

          The invention will be described in greater detail by way of specific examples. The following examples are offered for illustrative purposes, and are not intended to limit the invention in any manner. Those of skill in the art will readily recognize a variety of non-critical parameters that can be 15   changed or modified to yield alternative embodiments in accordance with the invention.

IV.   EXAMPLES
          The following example of peptide binding to HLA molecules demonstrates quantification of binding affinities of HLA class I and class II peptides. Binding assays can be performed with peptides 20   that are either motif-bearing or not motif-bearing.

Example 1. HLA Class I and Class II Binding Assays
          The following example of peptide binding to HLA molecules demonstrates quantification of binding affinities of HLA class I and class II peptides. Binding assays can be performed with peptides 25   that are either motif-bearing or not motif-bearing.
          HLA class I and class II binding assays using purified HLA molecules were performed in accordance with disclosed protocols (e.g., PCT publications WO 94/20127 and WO 94/03205; Sidney et al., Current Protocols in Immunology 18.3.1 (1998); Sidney, et al., J. Immunol. 154:247 (1995); Sette, et al., Mol. Immunol. 31:813 (1994)). Briefly, purified MHC molecules (5 to 500nM) were incubated with 30   various unlabeled peptide inhibitors and 1-10nM ^{125}I-radiolabeled probe peptides as described. Following incubation, MHC-peptide complexes were separated from free peptide by gel filtration and the fraction of peptide bound was determined. Typically, in preliminary experiments, each MHC preparation was titered in the presence of fixed amounts of radiolabeled peptides to determine the concentration of HLA molecules necessary to bind 10-20% of the total radioactivity. All subsequent inhibition and direct binding assays 35   were performed using these HLA concentrations.
          Since under these conditions [label]<[HLA] and IC$_{50}$≥[HLA], the measured IC$_{50}$ values are reasonable approximations of the true K$_D$ values. Peptide inhibitors are typically tested at concentrations ranging from 120 µg/ml to 1.2 ng/ml, and are tested in two to four completely independent experiments. To allow comparison of the data obtained in different experiments, a relative binding figure is 40   calculated for each peptide by dividing the IC$_{50}$ of a positive control for inhibition by the IC$_{50}$ for each

tested peptide (typically unlabeled versions of the radiolabeled probe peptide). For database purposes, and inter-experiment comparisons, relative binding values are compiled. These values can subsequently be converted back into IC_{50} nM values by dividing the IC_{50} nM of the positive controls for inhibition by the relative binding of the peptide of interest. This method of data compilation has proven to be the most accurate and consistent for comparing peptides that have been tested on different days, or with different lots of purified MHC.

Binding assays as outlined above may be used to analyze supermotif and/or motif-bearing epitopes as, for example, described in Example 2.

Example 2. Identification of HLA Supermotif- and Motif-Bearing CTL Candidate Epitopes

Vaccine compositions of the invention can include multiple epitopes that comprise multiple HLA supermotifs or motifs to achieve broad population coverage. This example illustrates the identification of supermotif- and motif-bearing epitopes for the inclusion in such a vaccine composition. Calculation of population coverage was performed using the strategy described below.

Computer searches and algorthims for identification of supermotif and/or motif-bearing epitopes
The searches performed to identify the motif-bearing peptide sequences in Examples 2 and 5 employed the protein sequence data from seven proteins (E1, E2, E5, E6, E7, L1 and L2) from HPV types 16, 18, 31, 33, 45, and 56.

Accession numbers for HPV types			
Protein	6a	6b	11
E1	Q84293 AAA74213	P03113 CAA25020 W1WL6	W1WL11 P04014 AAA46929
E2	Q84294 AAA74214	P03119 CAA25021 W2WL6	AAA46930 W2WLl1 P04015
E4	Q84295 AAA74215	CAA25022 W4WL6	P04016 W4WL11 AAA46931
E5a	Q84296 AAA74216	P06460 CAA25023 W5WL6A	W5WL11 P04017 AAA46932
E5b	N.A.	P06461 CAA25024 W5WLB	W5WL1B P04018 AAA46933
E6	Q84291 AAA74211	P06462 CAA25018 W6WL6	W6WL11 P04019 AAA21703 AAA46927
E7	Q84929 AAA74212	P06464 CAA25019 W7WL6	AAA46928 AAA21704 W7WL11 P04020
L1	P03100 AAA74218	P03100 CAA25026 P1WL6	P04012 P1WLl1 AAA4635
L2	Q84297	P03106 CAA25025	P2WL11 AAA46934

		P2WL6	P04013

Strain	Protein Antigen	Accession number
HPV16	E1	W1SLHS
HPV16	E2	W2WLHS
HPV16	E5	W5WLHS
HPV16	E6	W6WLHS
HPV16	E7	W7WLHS
HPV16	L1	AAD33259
HPV16	L2	AAD33258
HPV18	E1	W1WL18
HPV18	E2	WL18
HPV18	E5	W5WL18
HPV18	E6	W6WL18
HPV18	E7	PO6788
HPV18	L1	CAA28671
HPV18	L2	P2WL18
HPV31	E1	W1WL31
HPV31	E2	W2WL3
HPV31	E5	W5WL31
HPV31	E6	W6WL31
HPV31	E7	W7WL31
HPV31	L1	P1WL31
HPV31	L2	P2WL31
HPV45	E1	S36563
HPV45	E2	S36564
HPV45	E6	CAB44706
HPV45	E7	CAB44707
HPV45	L1	CAB44705
HPV45	L2	S36565
HPV33	E1	W1WL33
HPV33	E2	W2WL33
HPV33	E5	W5WL33
HPV33	E6	W6WL33
HPV33	E7	W7WL33
HPV33	L1	P1WL33
HPV33	L2	P2WL33
HPV56	E2	S36581
HPV56	E6	W6WL56
HPV56	E7	S36580
HPV56	L1	S38563

HPV56   L2   S36582

Computer searches for epitopes bearing HLA Class I or Class II supermotifs or motifs
were performed as follows. All translated HPV protein sequences were analyzed using a text string search
5   software program, *e.g.*, MotifSearch 1.4 (D. Brown, San Diego) to identify potential peptide sequences
containing appropriate HLA binding motifs; alternative programs are readily produced in accordance with
information in the art in view of the motif/supermotif disclosure herein. Furthermore, such calculations can
be made mentally.

Identified A2-, A3-, and DR-supermotif sequences were scored using polynomial
10 algorithms to predict their capacity to bind to specific HLA-Class I or Class II molecules. These
polynomial algorithms take into account both extended and refined motifs (that is, to account for the impact
of different amino acids at different positions), and are essentially based on the premise that the overall
affinity (or ΔG) of peptide-HLA molecule interactions can be approximated as a linear polynomial function
of the type:

15   "ΔG" = a_{1i} x a_{2i} x a_{3i} ...... x a_{ni}

where a_{ji} is a coefficient which represents the effect of the presence of a given amino acid
(j) at a given position (i) along the sequence of a peptide of n amino acids. The crucial assumption of this
method is that the effects at each position are essentially independent of each other (i.e., independent
binding of individual side-chains). When residue j occurs at position i in the peptide, it is assumed to
20 contribute a constant amount j_i to the free energy of binding of the peptide irrespective of the sequence of
the rest of the peptide. This assumption is justified by studies from our laboratories that demonstrated that
peptides are bound to MHC and recognized by T cells in essentially an extended conformation (data
omitted herein).

The method of derivation of specific algorithm coefficients has been described in
25 Gulukota *et al.*, *J. Mol. Biol.* 267:1258-126, 1997; (see also Sidney *et al.*, *Human Immunol.* 45:79-93, 1996;
and Southwood *et al.*, *J. Immunol.* 160:3363-3373, 1998). Briefly, for all *i* positions, anchor and non-
anchor alike, the geometric mean of the average relative binding (ARB) of all peptides carrying *j* is
calculated relative to the remainder of the group, and used as the estimate of j_i. For Class II peptides, if
multiple alignments are possible, only the highest scoring alignment is utilized, following an iterative
30 procedure. To calculate an algorithm score of a given peptide in a test set, the ARB values corresponding
to the sequence of the peptide are multiplied. If this product exceeds a chosen threshold, the peptide is
predicted to bind. Appropriate thresholds are chosen as a function of the degree of stringency of prediction
desired.

35 *Selection of HLA-A2 supertype cross-reactive peptides*

Complete protein sequences from the seven HPV structural and regulatory proteins of the
HPV strains listed above were aligned, then scanned, utilizing motif identification software, to identify 9-
and 10-mer sequences containing the HLA-A2-supermotif main anchor specificity.

HLA-A2 supermotif-bearing sequences are shown in Table VIII. Typically, these
40 sequences are then scored using the A2 algorithm and the peptides corresponding to the positive-scoring

sequences are synthesized and tested for their capacity to bind purified HLA-A*0201 molecules *in vitro* (HLA-A*0201 is considered a prototype A2 supertype molecule).

Examples of peptides that bind to HLA-A*0201 with IC_{50} values ≤500 nM are shown in Table VIII. These peptides are then tested for the capacity to bind to additional A2-supertype molecules
5   (A*0202, A*0203, A*0206, and A*6802). Peptides that bind to at least three of the five A2-supertype alleles tested are typically deemed A2-supertype cross-reactive binders. Preferred peptides bind at an affinity equal to or less than 500 nM to three or more HLA-A2 supertype molecules.

Selection of HLA-A3 supermotif-bearing epitopes
10   The HPV protein sequences scanned above were also examined for the presence of peptides with the HLA-A3-supermotif primary anchors (Table IX).

Peptides corresponding to the supermotif-bearing sequences are then synthesized and tested for binding to HLA-A*0301 and HLA-A*1101 molecules, the two most prevalent A3-supertype alleles. The peptides that are found to bind one of the two alleles with binding affinities of ≤500 nM, often
15   ≤ 200 nM, are then tested for binding cross-reactivity to the other common A3-supertype alleles (A*3101, A*3301, and A*6801) to identify those that can bind at least three of the five HLA-A3-supertype molecules tested.

Selection of HLA-B7 supermotif bearing epitopes
20   The same HPV target antigen protein sequences were also analyzed for the presence of 9- or 10-mer peptides with the HLA-B7-supermotif (Table XI).

Corresponding peptides are synthesized and tested for binding to HLA-B*0702, the most common B7-supertype allele (*i.e.*, the prototype B7 supertype allele). Peptides binding B*0702 with IC_{50} of ≤500 nM are identified using standard methods. These peptides are then tested for binding to other
25   common B7-supertype molecules (B*3501, B*5101, B*5301, and B*5401). Peptides capable of binding to three or more of the five B7-supertype alleles tested are thereby identified.

Selection of A1 and A24 motif-bearing epitopes
                  To further increase population coverage, HLA-A1 and -A24 epitopes can, for example,
30   also be incorporated into potential vaccine constructs. An analysis of the protein sequence data from the HPV target antigens utilized above can also be performed to identify HLA-A1- and A24-motif-containing sequences.

High affinity and/or cross-reactive binding epitopes that bear other motif and/or supermotifs are identified using analogous methodology.
35

Example 3. Confirmation of Immunogenicity
                  Cross-reactive candidate CTL A2-supermotif-bearing peptides that are identified as described in Example 2 were selected for *in vitro* immunogenicity testing. Testing was performed using the following methodology:
40

Target Cell Lines for Cellular Screening:

The .221A2.1 cell line, produced by transferring the HLA-A2.1 gene into the HLA-A, -B, -C null mutant human B-lymphoblastoid cell line 721.221, is used as the peptide-loaded target to measure activity of HLA-A2.1-restricted CTL. This cell line is grown in RPMI-1640 medium supplemented with antibiotics, sodium pyruvate, nonessential amino acids and 10% (v/v) heat inactivated FCS. Cells that express an antigen of interest, or transfectants comprising the gene encoding the antigen of interest, can be used as target cells to test the ability of peptide-specific CTLs to recognize endogenous antigen.

Primary CTL Induction Cultures:

Generation of Dendritic Cells (DC): PBMCs are thawed in RPMI with 30 g/ml DNAse, washed twice and resuspended in complete medium (RPMI-1640 plus 5% AB human serum, non-essential amino acids, sodium pyruvate, L-glutamine and penicillin/strpetomycin). The monocytes are purified by plating 10 x 10^6 PBMC/well in a 6-well plate. After 2 hours at 37°C, the non-adherent cells are removed by gently shaking the plates and aspirating the supernatants. The wells are washed a total of three times with 3 ml RPMI to remove most of the non-adherent and loosely adherent cells. Three ml of complete medium containing 50 ng/ml of GM-CSF and 1,000 U/ml of IL-4 are then added to each well. TNF   is added to the DCs on day 6 at 75 ng/ml and the cells are used for CTL induction cultures on day 7.

Induction of CTL with DC and Peptide: CD8+ T-cells are isolated by positive selection with Dynal immunomagnetic beads (Dynabeads® M-450) and the detacha-bead® reagent. Typically about 200-250x10^6 PBMC are processed to obtain 24x10^6 CD8$^+$ T-cells (enough for a 48-well plate culture). Briefly, the PBMCs are thawed in RPMI with 30μg/ml DNAse, washed once with PBS containing 1% human AB serum and resuspended in PBS/1% AB serum at a concentration of 20x10^{6}cells/ml. The magnetic beads are washed 3 times with PBS/AB serum, added to the cells (140μl beads/20x10^6 cells) and incubated for 1 hour at 4°C with continuous mixing. The beads and cells are washed 4x with PBS/AB serum to remove the nonadherent cells and resuspended at 100x10^6 cells/ml (based on the original cell number) in PBS/AB serum containing 100μl/ml detacha-bead® reagent and 30μg/ml DNAse. The mixture is incubated for 1 hour at room temperature with continuous mixing. The beads are washed again with PBS/AB/DNAse to collect the CD8+ T-cells. The DC are collected and centrifuged at 1300 rpm for 5-7 minutes, washed once with PBS with 1% BSA, counted and pulsed with 40μg/ml of peptide at a cell concentration of 1-2x10^6/ml in the presence of 3μg/ml β$_2$- microglobulin for 4 hours at 20°C. The DC are then irradiated (4,200 rads), washed 1 time with medium and counted again.

Setting up induction cultures: 0.25 ml cytokine-generated DC (@1x10^5 cells/ml) are co-cultured with 0.25ml of CD8+ T-cells (@2x10^6 cell/ml) in each well of a 48-well plate in the presence of 10 ng/ml of IL-7. Recombinant human IL10 is added the next day at a final concentration of 10 ng/ml and rhuman IL2 is added 48 hours later at 10IU/ml.

Restimulation of the induction cultures with peptide-pulsed adherent cells: Seven and fourteen days after the primary induction the cells are restimulated with peptide-pulsed adherent cells. The PBMCS are thawed and washed twice with RPMI and DNAse. The cells are resuspended at 5x10^6 cells/ml and irradiated at ~4200 rads. The PBMCs are plated at 2x10^6 in 0.5ml complete medium per well and incubated for 2 hours at 37°C. The plates are washed twice with RPMI by tapping the plate gently to

remove the nonadherent cells and the adherent cells pulsed with 10μg/ml of peptide in the presence of

3 μg/ml β₂ microglobulin in 0.25ml RPMI/5%AB per well for 2 hours at 37°C. Peptide solution from each

well is aspirated and the wells are washed once with RPMI. Most of the media is aspirated from the

induction cultures (CD8+ cells) and brought to 0.5 ml with fresh media. The cells are then transferred to

the wells containing the peptide-pulsed adherent cells. Twenty four hours later rhuman IL10 is added at a

final concentration of 10ng/ml and rhuman IL2 is added the next day and again 2-3 days later at 50IU/ml

(Tsai *et al.*, *Critical Reviews in Immunology* 18(1-2):65-75, 1998). Seven days later the cultures are

assayed for CTL activity in a ⁵¹Cr release assay. In some experiments the cultures are assayed for peptide-

specific recognition in the *in situ* IFNγ ELISA at the time of the second restimulation followed by assay of

endogenous recognition 7 days later. After expansion, activity is measured in both assays for a side by side

comparison.

Measurement of CTL lytic activity by ⁵¹Cr release.

Seven days after the second restimulation, cytotoxicity is determined in a standard (5hr)

⁵¹Cr release assay by assaying individual wells at a single E:T. Peptide-pulsed targets are prepared by

incubating the cells with 10μg/ml peptide overnight at 37°C.

Adherent target cells are removed from culture flasks with trypsin-EDTA. Target cells

are labelled with 200μCi of ⁵¹Cr sodium chromate (Dupont, Wilmington, DE) for 1 hour at 37°C. Labelled

target cells are resuspended at 10⁶ per ml and diluted 1:10 with K562 cells at a concentration of 3.3x10⁶/ml

(an NK-sensitive erythroblastoma cell line used to reduce non-specific lysis). Target cells (100 μl) and

100μl of effectors are plated in 96 well round-bottom plates and incubated for 5 hours at 37°C. At that

time, 100 μl of supernatant are collected from each well and percent lysis is determined according to the

formula: [(cpm of the test sample- cpm of the spontaneous ⁵¹Cr release sample)/(cpm of the maximal ⁵¹Cr

release sample- cpm of the spontaneous ⁵¹Cr release sample)] x 100. Maximum and spontaneous release

are determined by incubating the labelled targets with 1% Trition X-100 and media alone, respectively. A

positive culture is defined as one in which the specific lysis (sample- background) is 10% or higher in the

case of individual wells and is 15% or more at the 2 highest E:T ratios when expanded cultures are assayed.

In situ **Measurement of Human γIFN Production as an Indicator of Peptide-specific and Endogenous**

Recognition

Immulon 2 plates are coated with mouse anti-human IFNγ monoclonal antibody (4 μg/ml

0.1M NaHCO₃, pH8.2) overnight at 4°C. The plates are washed with Ca²⁺, Mg²⁺-free PBS/0.05% Tween

20 and blocked with PBS/10% FCS for 2 hours, after which the CTLs (100 μl/well) and targets (100

μl/well) are added to each well, leaving empty wells for the standards and blanks (which received media

only). The target cells, either peptide-pulsed or endogenous targets, are used at a concentration of 1x10⁶

cells/ml. The plates are incubated for 48 hours at 37°C with 5% CO₂.

Recombinant human IFNγ is added to the standard wells starting at 400 pg or

1200pg/100μl/well and the plate incubated for 2 hours at 37°C. The plates are washed and 100 l of

biotinylated mouse anti-human IFNγ monoclonal antibody (2μg/ml in PBS/3%FCS/0.05% Tween 20) are

added and incubated for 2 hours at room temperature. After washing again, 100 μl HRP-streptavidin

(1:4000) are added and the plates incubated for 1 hour at room temperature. The plates are then washed 6x with wash buffer, 100μl/well developing solution (TMB 1:1) are added, and the plates allowed to develop for 5-15 minutes. The reaction is stopped with 50 μl/well 1M H_3PO_4 and read at OD450. A culture is considered positive if it measured at least 50 pg of IFNγ/well above background and is twice the

5   background level of expression.

CTL Expansion. Those cultures that demonstrate specific lytic activity against peptide-pulsed targets and/or tumor targets are expanded over a two week period with anti-CD3. Briefly, $5x10^4$ CD8+ cells are added to a T25 flask containing the following: $1x10^6$ irradiated (4,200 rad) PBMC (autologous or allogeneic) per ml, $2x10^5$ irradiated (8,000 rad) EBV- transformed cells per ml, and OKT3

10   (anti-CD3) at 30ng per ml in RPMI-1640 containing 10% (v/v) human AB serum, non-essential amino acids, sodium pyruvate, 25μM 2-mercaptoethanol, L-glutamine and penicillin/streptomycin. Rhuman IL2 is added 24 hours later at a final concentration of 200IU/ml and every 3 days thereafter with fresh media at 50IU/ml. The cells are split if the cell concentration exceeded $1x10^6$/ml and the cultures are assayed between days 13 and 15 at E:T ratios of 30, 10, 3 and 1:1 in the ^{51}Cr release assay or at $1x10^6$/ml in the *in*

15   *situ* IFN assay using the same targets as before the expansion.

Cultures are expanded in the absence of anti-CD3^{+} as follows. Those cultures that demonstrate specific lytic activity against peptide and endogenous targets are selected and $5x10^4$ CD8^{+} cells are added to a T25 flask containing the following: $1x10^6$ autologous PBMC per ml which have been peptide-pulsed with 10μg/ml peptide for 2 hours at 37°C and irradiated (4,200 rad); $2x10^5$ irradiated (8,000

20   rad) EBV-transformed cells per ml RPMI-1640 containing 10%(v/v) human AB serum, non-essential AA, sodium pyruvate, 25mM 2-ME, L-glutamine and gentamicin.

Immunogenicity of A2 supermotif-bearing peptides

A2-supermotif cross-reactive binding peptides are tested in the cellular assay for the

25   ability to induce peptide-specific CTL in normal individuals. In this analysis, a peptide is typically considered to be an epitope if it induces peptide-specific CTLs in at least 2 donors (unless otherwise noted) and preferably, also recognizes the endogenously expressed peptide.

Immunogenicity is additionally confirmed using PBMCs isolated from HPV-infected patients. Briefly, PBMCs are isolated from patients, re-stimulated with peptide-pulsed monocytes and

30   assayed for the ability to recognize peptide-pulsed target cells as well as transfected cells endogenously expressing the antigen.

*Evaluation of A*03/A11 immunogenicity*

HLA-A3 supermotif-bearing cross-reactive binding peptides are also evaluated for

35   immunogenicity using methodology analogous for that used to evaluate the immunogenicity of the HLA-A2 supermotif peptides.

Evaluation of B7 immunogenicity

      Immunogenicity screening of the B7-supertype cross-reactive binding peptides identified in Example 2 are evaluated in a manner analogous to the evaluation of A2-and A3-supermotif-bearing peptides.

5

      Peptides bearing other supermotifs/motifs, *e.g.*, HLA-A1, HLA-A24 *etc.* are also evaluated using similar methodology

10 Example 4. Implementation of the Extended Supermotif to Improve the Binding Capacity of Native
Epitopes by Creating Analogs

      HLA motifs and supermotifs (comprising primary and/or secondary residues) are useful in the identification and preparation of highly cross-reactive native peptides, as demonstrated herein. Moreover, the definition of HLA motifs and supermotifs also allows one to engineer highly cross-reactive epitopes by identifying residues within a native peptide sequence which can be analoged, or "fixed" to

15 confer upon the peptide certain characteristics, *e.g.* greater cross-reactivity within the group of HLA molecules that comprise a supertype, and/or greater binding affinity for some or all of those HLA molecules. Examples of analoging peptides to exhibit modulated binding affinity are set forth in this example.

20 *Analoging at Primary Anchor Residues*

      Peptide engineering strategies are implemented to further increase the cross-reactivity of the epitopes. For example, on the basis of the data disclosed, *e.g.*, in related and co-pending U.S.S.N 09/226,775, the main anchors of A2-supermotif-bearing peptides are altered, for example, to introduce a preferred L, I, V, or M at position 2, and I or V at the C-terminus.

25   To analyze the cross-reactivity of the analog peptides, each engineered analog is initially tested for binding to the prototype A2 supertype allele A*0201 then, if A*0201 binding capacity is maintained, for A2-supertype cross-reactivity.

      Alternatively, a peptide is tested for binding to one or all supertype members and then analogued to modulate binding affinity to any one (or more) of the supertype members to add population

30 coverage.

      The selection of analogs for immunogenicity in a cellular screening analysis is typically further restricted by the capacity of the parent peptide to bind at least weakly, *i.e.*, bind at an IC_{50} of 5000nM or less, to three of more A2 supertype alleles. The rationale for this requirement is that the WT peptides must be present endogenously in sufficient quantity to be biologically relevant. Analoged peptides

35 have been shown to have increased immunogenicity and cross-reactivity by T cells specific for the parent epitope (*see, e.g.*, Parkhurst *et al.*, *J. Immunol.* 157:2539, 1996; and Pogue *et al.*, *Proc. Natl. Acad. Sci. USA* 92:8166, 1995).

      In the cellular screening of these peptide analogs, it is important to demonstrate that analog-specific CTLs are also able to recognize the wild-type peptide and, when possible, target cells that

40 endogenously express the epitope.

Analoging of HLA-A3 and B7-supermotif-bearing peptides

Analogs of HLA-A3 supermotif epitopes are generated using strategies similar to those employed in analoging HLA-A2 supermotif-bearing peptides. For example, peptides binding to 3/5

5   of the A3-supertype molecules are engineered at primary anchor residues to possess a preferred residue (V, S, M, or A) at position 2.

The analog peptides are then tested for the ability to bind A*03 and A*11 (prototype A3 supertype alleles). Those peptides that demonstrate ≤ 500 nM binding capacity are then tested for A3-supertype cross-reactivity.

10   Similarly to the A2- and A3- motif bearing peptides, peptides binding 3 or more B7-supertype alleles can be improved, where possible, to achieve increased cross-reactive binding. B7 supermotif-bearing peptides are, for example, engineered to possess a preferred residue (V, I, L, or F) at the C-terminal primary anchor position, as demonstrated by Sidney *et al.* (*J. Immunol.* 157:3480-3490, 1996).

Analoguing at primary anchor residues of other motif and/or supermotif-bearing epitopes

15   is performed in a like manner.

The analog peptides are then tested for immunogenicity, typically in a cellular screening assay. Again, it is generally important to demonstrate that analog-specific CTLs are also able to recognize the wild-type peptide and, when possible, targets that endogenously express the epitope.

20   *Analoging at Secondary Anchor Residues*

Moreover, HLA supermotifs are of value in engineering highly cross-reactive peptides and/or peptides that bind HLA molecules with increased affinity by identifying particular residues at secondary anchor positions that are associated with such properties. For example, the binding capacity of a B7 supermotif-bearing peptide with an F residue at postion 1 is analyzed. The peptide is then analoged to,

25   for example, substitute L for F at position 1. The analoged peptide is evaluated for increased binding affinity/ and or increased cross-reactivity. Such a procedure identifies analoged peptides with modulated binding affinity.

Engineered analogs with sufficiently improved binding capacity or cross-reactivity can also be tested for immunogenicity in HLA-B7-transgenic mice, following for example, IFA immunization

30   or lipopeptide immunization. Analogued peptides are additionally tested for the ability to stimulate a recall response using PBMC from HPV-infected patients.

Other analoguing strategies

Another form of peptide analoguing, unrelated to the anchor positions, involves the

35   substitution of a cysteine with α-amino butyric acid. Due to its chemical nature, cysteine has the propensity to form disulfide bridges and sufficiently alter the peptide structurally so as to reduce binding capacity. Subtitution of α-amino butyric acid for cysteine not only alleviates this problem, but has been shown to improve binding and crossbinding capabilities in some instances (*see, e.g.,* the review by Sette *et al.,* In: Persistent Viral Infections, Eds. R. Ahmed and I. Chen, John Wiley & Sons, England, 1999).

Thus, by the use of even single amino acid substitutions, the binding affinity and/or cross-reactivity of peptide ligands for HLA supertype molecules can be modulated.

Example 5. Identification of HPV-derived sequences with HLA-DR binding motifs

5   Peptide epitopes bearing an HLA class II supermotif or motif are identified as outlined below using methodology similar to that described in Examples 1-3.

Selection of HLA-DR-supermotif-bearing epitopes.

          To identify HPV-derived, HLA class II HTL epitopes, the protein sequences from the
10   same HPV antigens used for the identification of HLA Class I supermotif/motif sequences were analyzed for the presence of sequences bearing an HLA-DR-motif or supermotif. Specifically, 15-mer sequences were selected comprising a DR-supermotif, further comprising a 9-mer core, and three-residue N- and C-terminal flanking regions (15 amino acids total).

          Protocols for predicting peptide binding to DR molecules have been developed
15   (Southwood *et al.*, *J. Immunol.* 160:3363-3373, 1998). These protocols, specific for individual DR molecules, allow the scoring, and ranking, of 9-mer core regions. Each protocol not only scores peptide sequences for the presence of DR-supermotif primary anchors (i.e., at position 1 and position 6) within a 9-mer core, but additionally evaluates sequences for the presence of secondary anchors. Using allele specific selection tables (see, *e.g.*, Southwood *et al.*, *ibid.*), it has been found that these protocols efficiently select
20   peptide sequences with a high probability of binding a particular DR molecule. Additionally, it has been found that performing these protocols in tandem, specifically those for DR1, DR4w4, and DR7, can efficiently select DR cross-reactive peptides.

          The HPV-derived peptides identified above are tested for their binding capacity for various common HLA-DR molecules. All peptides are initially tested for binding to the DR molecules in
25   the primary panel: DR1, DR4w4, and DR7. Peptides binding at least 2 of these 3 DR molecules are then tested for binding to DR2w2 β1, DR2w2 β2, DR6w19, and DR9 molecules in secondary assays. Finally, peptides binding at least 2 of the 4 secondary panel DR molecules, and thus cumulatively at least 4 of 7 different DR molecules, are screened for binding to DR4w15, DR5w11, and DR8w2 molecules in tertiary assays. Peptides binding at least 7 of the 10 DR molecules comprising the primary, secondary, and tertiary
30   screening assays are considered cross-reactive DR binders. HPV-derived peptides found to bind common HLA-DR alleles are of particular interest.

Selection of DR3 motif peptides

          Because HLA-DR3 is an allele that is prevalent in Caucasian, Black, and Hispanic
35   populations, DR3 binding capacity is an important criterion in the selection of HTL epitopes. However, data generated previously indicated that DR3 only rarely cross-reacts with other DR alleles (Sidney *et al.*, *J. Immunol.* 149:2634-2640, 1992; Geluk *et al.*, *J. Immunol.* 152:5742-5748, 1994; Southwood *et al.*, *J. Immunol.* 160:3363-3373, 1998). This is not entirely surprising in that the DR3 peptide-binding motif appears to be distinct from the specificity of most other DR alleles. For maximum efficiency in developing
40   vaccine candidates it would be desirable for DR3 motifs to be clustered in proximity with DR supermotif

74

regions. Thus, peptides shown to be candidates may also be assayed for their DR3 binding capacity. However, in view of the distinct binding specificity of the DR3 motif, peptides binding only to DR3 can also be considered as candidates for inclusion in a vaccine formulation.

To efficiently identify peptides that bind DR3, target HPV antigens are analyzed for
5   sequences carrying one of the two DR3 specific binding motifs reported by Geluk *et al.* (*J. Immunol.* 152:5742-5748, 1994). The corresponding peptides are then synthesized and tested for the ability to bind DR3 with an affinity of 1μM or better, i.e., less than 1 μM. Peptides are found that meet this binding criterion and qualify as HLA class II high affinity binders.

DR3 binding epitopes identified in this manner are included in vaccine compositions with
10   DR supermotif-bearing peptide epitopes.

Similarly to the case of HLA class I motif-bearing peptides, the class II motif-bearing peptides are analoged to improve affinity or cross-reactivity. For example, aspartic acid at position 4 of the 9-mer core sequence is an optimal residue for DR3 binding, and substitution for that residue often improves DR 3 binding.

15

Example 6. Immunogenicity of HPV-derived HTL epitopes

This example determines immunogenic DR supermotif- and DR3 motif-bearing epitopes among those identified using the methodology in Example 5.

Immunogenicity of HTL epitopes are evaluated in a manner analogous to the
20   determination of immunogenicity of CTL epitopes by assessing the ability to stimulate HTL responses and/or by using appropriate transgenic mouse models. Immunogenicity is determined by screening for: 1.) *in vitro* primary induction using normal PBMC or 2.) recall responses from cancer patient PBMCs.

Example 7. Calculation of phenotypic frequencies of HLA-supertypes in various ethnic backgrounds to
25   determine breadth of population coverage

This example illustrates the assessment of the breadth of population coverage of a vaccine composition comprised of multiple epitopes comprising multiple supermotifs and/or motifs.

In order to analyze population coverage, gene frequencies of HLA alleles were determined. Gene frequencies for each HLA allele were calculated from antigen or allele frequencies
30   utilizing the binomial distribution formulae gf=1-(SQRT(1-af)) (see, *e.g.*, Sidney *et al.*, *Human Immunol.* 45:79-93, 1996). To obtain overall phenotypic frequencies, cumulative gene frequencies were calculated, and the cumulative antigen frequencies derived by the use of the inverse formula [af=1-(1-Cgf)^2].

Where frequency data was not available at the level of DNA typing, correspondence to the serologically defined antigen frequencies was assumed. To obtain total potential supertype population
35   coverage no linkage disequilibrium was assumed, and only alleles confirmed to belong to each of the supertypes were included (minimal estimates). Estimates of total potential coverage achieved by inter-loci combinations were made by adding to the A coverage the proportion of the non-A covered population that could be expected to be covered by the B alleles considered (e.g., total=A+B*(1-A)). Confirmed members of the A3-like supertype are A3, A11, A31, A*3301, and A*6801. Although the A3-like supertype may
40   also include A34, A66, and A*7401, these alleles were not included in overall frequency calculations.

Likewise, confirmed members of the A2-like supertype family are A*0201, A*0202, A*0203, A*0204, A*0205, A*0206, A*0207, A*6802, and A*6901. Finally, the B7-like supertype-confirmed alleles are: B7, B*3501-03, B51, B*5301, B*5401, B*5501-2, B*5601, B*6701, and B*7801 (potentially also B*1401, B*3504-06, B*4201, and B*5602).

5   Population coverage achieved by combining the A2-, A3- and B7-supertypes is approximately 86% in five major ethnic groups, *supra*. Coverage may be extended by including peptides bearing the A1 and A24 motifs. On average, A1 is present in 12% and A24 in 29% of the population across five different major ethnic groups (Caucasian, North American Black, Chinese, Japanese, and Hispanic). Together, these alleles are represented with an average frequency of 39% in these same ethnic populations.

10   The total coverage across the major ethnicities when A1 and A24 are combined with the coverage of the A2-, A3- and B7-supertype alleles is >95%. An analogous approach can be used to estimate population coverage achieved with combinations of class II motif-bearing epitopes.

Immunogenicity studies in humans (*e.g.*, Bertoni *et al.*, *J. Clin. Invest.* 100:503, 1997; Doolan *et al.*, *Immunity* 7:97, 1997; and Threlkeld *et al.*, *J. Immunol.* 159:1648, 1997) have shown that

15   highly cross-reactive binding peptides are almost always recognized as epitopes. The use of highly cross-reactive binding peptides is an important selection criterion in identifying candidate epitopes for inclusion in a vaccine that is immunogenic in a diverse population.

With a sufficient number of epitopes (as disclosed herein and from the art), an average population coverage is predicted to be greater than 95% in each of five major ethnic populations. The game

20   theory Monte Carlo simulation analysis, which is known in the art (see *e.g.*, Osborne, M.J. and Rubinstein, A. "A course in game theory" MIT Press, 1994), can be used to estimate what percentage of the individuals in a population comprised of the Caucasian, North American Black, Japanese, Chinese, and Hispanic ethnic groups would recognize the vaccine epitopes described herein. A preferred percentage is 90%. A more preferred percentage is 95%.

25

Example 8. CTL Recognition Of Endogenous Processed Antigens After Priming

This example determines that CTL induced by native or analogued peptide epitopes identified and selected as described in Examples 1-6 recognize endogenously synthesized, *i.e.*, native antigens.

30   Effector cells isolated from transgenic mice that are immunized with peptide epitopes as in Example 3, for example HLA-A2 supermotif-bearing epitopes, are re-stimulated *in vitro* using peptide-coated stimulator cells. Six days later, effector cells are assayed for cytotoxicity and the cell lines that contain peptide-specific cytotoxic activity are further re-stimulated. An additional six days later, these cell lines are tested for cytotoxic activity on ^{51}Cr labeled Jurkat-A2.1/K^b target cells in the absence or presence

35   of peptide, and also tested on ^{51}Cr labeled target cells bearing the endogenously synthesized antigen, *i.e.* cells that are stably transfected with HPV expression vectors.

The result will demonstrate that CTL lines obtained from animals primed with peptide epitope recognize endogenously synthesized HPV antigen. The choice of transgenic mouse model to be used for such an analysis depends upon the epitope(s) that is being evaluated. In addition to HLA-

40   A*0201/K^b transgenic mice, several other transgenic mouse models including mice with human A11, which

76

may also be used to evaluate A3 epitopes, and B7 alleles have been characterized and others (*e.g.*, transgenic mice for HLA-A1 and A24) are being developed. HLA-DR1 and HLA-DR3 mouse models have also been developed, which may be used to evaluate HTL epitopes.

5   Example 9 Activity Of CTL-HTL Conjugated Epitopes In Transgenic Mice

This example illustrates the induction of CTLs and HTLs in transgenic mice by use of a tumor associated antigen CTL/HTL peptide conjugate whereby the vaccine composition comprises peptides to be administered to an HPV-infected patient. The peptide composition can comprise multiple CTL and/or HTL epitopes and further, can comprise epitopes selected from multiple HPV target antigens. The epitopes

10   are identified using methodology as described in Examples 1-6 This analysis demonstrates the enhanced immunogenicity that can be achieved by inclusion of one or more HTL epitopes in a vaccine composition. Such a peptide composition can comprise an HTL epitope conjugated to a preferred CTL epitope containing, for example, at least one CTL epitope that binds to multiple HLA family members at an affinity of 500 nM or less, or analogs of that epitope. The peptides may be lipidated, if desired.

15   Immunization procedures: Immunization of transgenic mice is performed as described (Alexander *et al.*, *J. Immunol.* 159:4753-4761, 1997). For example, A2/K^b mice, which are transgenic for the human HLA A2.1 allele and are useful for the assessment of the immunogenicity of HLA-A*0201 motif- or HLA-A2 supermotif-bearing epitopes, are primed subcutaneously (base of the tail) with a 0.1 ml of peptide in Incomplete Freund's Adjuvant, or if the peptide composition is a lipidated CTL/HTL

20   conjugate, in DMSO/saline or if the peptide composition is a polypeptide, in PBS or Incomplete Freund's Adjuvant. Seven days after priming, splenocytes obtained from these animals are restimulated with syngenic irradiated LPS-activated lymphoblasts coated with peptide.

Cell lines: Target cells for peptide-specific cytotoxicity assays are Jurkat cells transfected with the HLA-A2.1/K^b chimeric gene (*e.g.*, Vitiello *et al.*, *J. Exp. Med.* 173:1007, 1991)

25   *In vitro* CTL activation: One week after priming, spleen cells (30x10^6 cells/flask) are co-cultured at 37°C with syngeneic, irradiated (3000 rads), peptide coated lymphoblasts (10x10^6 cells/flask) in 10 ml of culture medium/T25 flask. After six days, effector cells are harvested and assayed for cytotoxic activity.

Assay for cytotoxic activity: Target cells (1.0 to 1.5x10^6) are incubated at 37°C in the

30   presence of 200 μl of ^{51}Cr. After 60 minutes, cells are washed three times and resuspended in R10 medium. Peptide is added where required at a concentration of 1 μg/ml. For the assay, 10^4 ^{51}Cr-labeled target cells are added to different concentrations of effector cells (final volume of 200 μl) in U-bottom 96-well plates. After a 6 hour incubation period at 37°C, a 0.1 ml aliquot of supernatant is removed from each well and radioactivity is determined in a Micromedic automatic gamma counter. The percent specific lysis is

35   determined by the formula: percent specific release = 100 x (experimental release - spontaneous release)/(maximum release - spontaneous release). To facilitate comparison between separate CTL assays run under the same conditions, % ^{51}Cr release data is expressed as lytic units/10^6 cells. One lytic unit is arbitrarily defined as the number of effector cells required to achieve 30% lysis of 10,000 target cells in a 6 hour ^{51}Cr release assay. To obtain specific lytic units/10^6, the lytic units/10^6 obtained in the absence of

40   peptide is subtracted from the lytic units/10^6 obtained in the presence of peptide. For example, if 30% ^{51}Cr

release is obtained at the effector (E): target (T) ratio of 50:1 (i.e., 5×10^5 effector cells for 10,000 targets) in the absence of peptide and 5:1 (i.e., 5×10^4 effector cells for 10,000 targets) in the presence of peptide, the specific lytic units would be: $[(1/50,000)-(1/500,000)] \times 10^6 = 18$ LU.

The results are analyzed to assess the magnitude of the CTL responses of animals injected with the immunogenic CTL/HTL conjugate vaccine preparation and are compared to the magnitude of the CTL response achieved using the CTL epitope as outlined in Example 3. Analyses similar to this may be performed to evaluate the immunogenicity of peptide conjugates containing multiple CTL epitopes and/or multiple HTL epitopes. In accordance with these procedures it is found that a CTL response is induced, and concomitantly that an HTL response is induced upon administration of such compositions.

Example 10. Selection of CTL and HTL epitopes for inclusion in an HPV-specific vaccine.

This example illustrates the procedure for the selection of peptide epitopes for vaccine compositions of the invention. The peptides in the composition can be in the form of a nucleic acid sequence, either single or one or more sequences (i.e., minigene) that encodes peptide(s), or can be single and/or polyepitopic peptides.

The following principles are utilized when selecting an array of epitopes for inclusion in a vaccine composition. Each of the following principles is balanced in order to make the selection.

Epitopes are selected which, upon administration, mimic immune responses that have been observed to be correlated with HPV clearance. The number of epitopes used depends on observations of patients who spontaneously clear HPV. For example, if it has been observed that patients who spontaneously clear HPV generate an immune response to at least 3 epitopes on at least one HPV antigen, then 3-4 epitopes should be included for HLA class I. A similar rationale is used to determine HLA class II epitopes.

When selecting an array of HPV epitopes, it is preferred that at least some of the epitopes are derived from early and late proteins. The early proteins of HPV are expressed when the virus is replicating, either following acute or dormant infection. Therefore, it is particularly preferred to use epitopes from early stage proteins to alleviate disease manifestations at the earliest stage possible.

Epitopes are often selected that have a binding affinity of an IC_{50} of 500 nM or less for an HLA class I molecule, or for class II, an IC_{50} of 1000 nM or less.

Sufficient supermotif bearing peptides, or a sufficient array of allele-specific motif bearing peptides, are selected to give broad population coverage. For example, epitopes are selected to provide at least 80% population coverage. A Monte Carlo analysis, a statistical evaluation known in the art, can be employed to assess breadth, or redundancy, of population coverage.

When creating a polyepitopic compositions, e.g. a minigene, it is typically desirable to generate the smallest peptide possible that encompasses the epitopes of interest. The principles employed are similar, if not the same, as those employed when selecting a peptide comprising nested epitopes.

In cases where the sequences of multiple variants of the same target protein are available, potential peptide epitopes can also be selected on the basis of their conservancy. For example, a criterion for conservancy may define that the entire sequence of an HLA class I binding peptide or the entire 9-mer

core of a class II binding peptide be conserved in a designated percentage of the sequences evaluated for a specific protein antigen.

A vaccine composition comprised of selected peptides, when administered, is safe, efficacious, and elicits an immune response similar in magnitude to an immune response that controls or

5   clears an acute HPV infection.

Example 11. Construction of Minigene Multi-Epitope DNA Plasmids

This example provides general guidance for the construction of a minigene expression plasmid. Minigene plasmids may, of course, contain various configurations of CTL and/or HTL epitopes or

10   epitope analogs as described herein. Examples of the construction and evaluation of expression plasmids are described, for example, in co-pending U.S.S.N. 09/311,784 filed 5/13/99.

A minigene expression plasmid typically includes multiple CTL and HTL peptide epitopes. In the present example, HLA-A2, -A3, -B7 supermotif-bearing peptide epitopes and HLA-A1 and -A24 motif-bearing peptide epitopes are used in conjunction with DR supermotif-bearing epitopes and/or

15   DR3 epitopes. HLA class I supermotif or motif-bearing peptide epitopes derived from multiple HPV antigens, preferably including both early and late phase antigens, are selected such that multiple supermotifs/motifs are represented to ensure broad population coverage. Similarly, HLA class II epitopes are selected from multiple HPV antigens to provide broad population coverage, *i.e.* both HLA DR-1-4-7 supermotif-bearing epitopes and HLA DR-3 motif-bearing epitopes are selected for inclusion in the

20   minigene construct. The selected CTL and HTL epitopes are then incorporated into a minigene for expression in an expression vector.

Such a construct may additionally include sequences that direct the HTL epitopes to the endoplasmic reticulum. For example, the Ii protein may be fused to one or more HTL epitopes as described in co-pending application U.S.S.N. 09/311,784 filed 5/13/99, wherein the CLIP sequence of the Ii protein is

25   removed and replaced with an HLA class II epitope sequence so that HLA class II epitope is directed to the endoplasmic reticulum, where the epitope binds to an HLA class II molecules.

This example illustrates the methods to be used for construction of a minigene-bearing expression plasmid. Other expression vectors that may be used for minigene compositions are available and known to those of skill in the art.

30   The minigene DNA plasmid of this example contains a consensus Kozak sequence and a consensus murine kappa Ig-light chain signal sequence followed by CTL and/or HTL epitopes selected in accordance with principles disclosed herein. The sequence encodes an open reading frame fused to the Myc and His antibody epitope tag coded for by the pcDNA 3.1 Myc-His vector.

Overlapping oligonucleotides that can, for example, average about 70 nucleotides in

35   length with 15 nucleotide overlaps, are synthesized and HPLC-purified. The oligonucleotides encode the selected peptide epitopes as well as appropriate linker nucleotides, Kozak sequence, and signal sequence. The final multiepitope minigene is assembled by extending the overlapping oligonucleotides in three sets of reactions using PCR. A Perkin/Elmer 9600 PCR machine is used and a total of 30 cycles are performed using the following conditions: 95°C for 15 sec, annealing temperature (5° below the lowest calculated Tm

40   of each primer pair) for 30 sec, and 72°C for 1 min.

For example, a minigene can be prepared as follows. For a first PCR reaction, 5 µg of each of two oligonucleotides are annealed and extended: In an example using eight oligonucleotides, i.e., four pairs of primers, oligonucleotides 1+2, 3+4, 5+6, and 7+8 are combined in 100 µl reactions containing *Pfu* polymerase buffer (1x= 10 mM KCL, 10 mM (NH4)$_2$SO$_4$, 20 mM Tris-chloride, pH 8.75, 2 mM

5   MgSO$_4$, 0.1% Triton X-100, 100 µg/ml BSA), 0.25 mM each dNTP, and 2.5 U of *Pfu* polymerase. The full-length dimer products are gel-purified, and two reactions containing the product of 1+2 and 3+4, and the product of 5+6 and 7+8 are mixed, annealed, and extended for 10 cycles. Half of the two reactions are then mixed, and 5 cycles of annealing and extension carried out before flanking primers are added to amplify the full length product. The full-length product is gel-purified and cloned into pCR-blunt

10   (Invitrogen) and individual clones are screened by sequencing.

Example 12. The plasmid construct and the degree to which it induces immunogenicity.

The degree to which a plasmid construct, for example a plasmid constructed in accordance with Example 11, is able to induce immunogenicity can be evaluated *in vitro* by testing for

15   epitope presentation by APC following transduction or transfection of the APC with an epitope-expressing nucleic acid construct. Such a study determines "antigenicity" and allows the use of human APC. The assay determines the ability of the epitope to be presented by the APC in a context that is recognized by a T cell by quantifying the density of epitope-HLA class I complexes on the cell surface. Quantitation can be performed by directly measuring the amount of peptide eluted from the APC (*see, e.g.*, Sijts *et al.*, *J.*

20   *Immunol.* 156:683-692, 1996; Demotz *et al.*, *Nature* 342:682-684, 1989); or the number of peptide-HLA class I complexes can be estimated by measuring the amount of lysis or lymphokine release induced by infected or transfected target cells, and then determining the concentration of peptide necessary to obtained equivalent levels of lysis or lymphokine release (*see, e.g.*, Kageyama *et al.*, *J. Immunol.* 154:567-576, 1995).

25   Alternatively, immunogenicity can be evaluated through *in vivo* injections into mice and subsequent *in vitro* assessment of CTL and HTL activity, which are analysed using cytotoxicity and proliferation assays, respectively, as detailed *e.g.*, in copending U.S.S.N. 09/311,784 filed 5/13/99 and Alexander *et al.*, *Immunity* 1:751-761, 1994.

For example, to assess the capacity of a DNA minigene construct (*e.g.*, a pMin minigene

30   construct generated as decribed in U.S.S.N. 09/311,784) containing at least one HLA-A2 supermotif peptide to induce CTLs *in vivo*, HLA-A2.1/K^b transgenic mice, for example, are immunized intramuscularly with 100 µg of naked cDNA. As a means of comparing the level of CTLs induced by cDNA immunization, a control group of animals is also immunized with an actual peptide composition that comprises multiple epitopes synthesized as a single polypeptide as they would be encoded by the minigene.

35   Splenocytes from immunized animals are stimulated twice with each of the respective peptide compositions (peptide epitopes encoded in the minigene or the polyepitopic peptide), then assayed for peptide-specific cytotoxic activity in a ^{51}Cr release assay. The results indicate the magnitude of the CTL response directed against the A2-restricted epitope, thus indicating the *in vivo* immunogenicity of the minigene vaccine and polyepitopic vaccine. It is, therefore, found that the minigene elicits immune

40   responses directed toward the HLA-A2 supermotif peptide epitopes as does the polyepitopic peptide

vaccine. A similar analysis is also performed using other HLA-A3 and HLA-B7 transgenic mouse models to assess CTL induction by HLA-A3 and HLA-B7 motif or supermotif epitopes.

　　　　To assess the capacity of a class II epitope encoding minigene to induce HTLs *in vivo*, DR transgenic mice, or for those epitope that cross react with the appropriate mouse MHC molecule, I-A^b-restricted mice, for example, are immunized intramuscularly with 100 μg of plasmid DNA. As a means of comparing the level of HTLs induced by DNA immunization, a group of control animals is also immunized with an actual peptide composition emulsified in complete Freund's adjuvant. CD4+ T cells, *i.e.* HTLs, are purified from splenocytes of immunized animals and stimulated with each of the respective compositions (peptides encoded in the minigene). The HTL response is measured using a ^{3}H-thymidine incorporation proliferation assay, (*see, e.g.,* Alexander et al. Immunity 1:751-761, 1994). The results indicate the magnitude of the HTL response, thus demonstrating the *in vivo* immunogenicity of the minigene.

　　　　DNA minigenes, constructed as described in Example 11, may also be evaluated as a vaccine in combination with a boosting agent using a prime boost protocol. The boosting agent can consist of recombinant protein (*e.g.*, Barnett *et al.*, *Aids Res. and Human Retroviruses* 14, Supplement 3:S299-S309, 1998) or recombinant vaccinia, for example, expressing a minigene or DNA encoding the complete protein of interest (*see, e.g.,* Hanke *et al.*, *Vaccine* 16:439-445, 1998; Sedegah *et al.*, *Proc. Natl. Acad. Sci USA* 95:7648-53, 1998; Hanke and McMichael, *Immunol. Letters* 66:177-181, 1999; and Robinson *et al.*, *Nature Med.* 5:526-34, 1999).

　　　　For example, the efficacy of the DNA minigene used in a prime boost protocol is initially evaluated in transgenic mice. In this example, A2.1/K^b transgenic mice are immunized IM with 100　g of a DNA minigene encoding the immunogenic peptides including at least one HLA-A2 supermotif-bearing peptide. After an incubation period (ranging from 3-9 weeks), the mice are boosted IP with 10^7 pfu/mouse of a recombinant vaccinia virus expressing the same sequence encoded by the DNA minigene. Control mice are immunized with 100　g of DNA or recombinant vaccinia without the minigene sequence, or with DNA encoding the minigene, but without the vaccinia boost. After an additional incubation period of two weeks, splenocytes from the mice are immediately assayed for peptide-specific activity in an ELISPOT assay. Additionally, splenocytes are stimulated *in vitro* with the A2-restricted peptide epitopes encoded in the minigene and recombinant vaccinia, then assayed for peptide-specific activity in an IFN-　ELISA.

　　　　It is found that the minigene utilized in a prime-boost protocol elicits greater immune responses toward the HLA-A2 supermotif peptides than with DNA alone. Such an analysis can also be performed using HLA-A11 or HLA-B7 transgenic mouse models to assess CTL induction by HLA-A3 or HLA-B7 motif or supermotif epitopes.

　　　　The use of prime boost protocols in humans is described in Example 20.

Example 13. Peptide Composition for Prophylactic Uses

　　　　Vaccine compositions of the present invention can be used to prevent HPV infection in persons who are at risk for such infection. For example, a polyepitopic peptide epitope composition (or a nucleic acid comprising the same) containing multiple CTL and HTL epitopes such as those selected in Examples 9 and/or 10, which are also selected to target greater than 80% of the population, is administered to individuals at risk for HPV infection.

For example, a peptide-based composition can be provided as a single polypeptide that encompasses multiple epitopes. The vaccine is typically administered in a physiological solution that comprises an adjuvant, such as Incomplete Freunds Adjuvant. The dose of peptide for the initial immunization is from about 1 to about 50,000 μg, generally 100-5,000 μg, for a 70 kg patient. The initial administration of vaccine is followed by booster dosages at 4 weeks followed by evaluation of the magnitude of the immune response in the patient, by techniques that determine the presence of epitope-specific CTL populations in a PBMC sample. Additional booster doses are administered as required. The composition is found to be both safe and efficacious as a prophylaxis against HPV infection.

Alternatively, a composition typically comprising transfecting agents can be used for the administration of a nucleic acid-based vaccine in accordance with methodologies known in the art and disclosed herein.

Example 14. Polyepitopic Vaccine Compositions Derived from Native HPV Sequences

A native HPV polyprotein sequence is screened, preferably using computer algorithms defined for each class I and/or class II supermotif or motif, to identify "relatively short" regions of the polyprotein that comprise multiple epitopes and is preferably less in length than an entire native antigen. This relatively short sequence that contains multiple distinct, even overlapping, epitopes is selected and used to generate a minigene construct. The construct is engineered to express the peptide, which corresponds to the native protein sequence. The "relatively short" peptide is generally less than 250 amino acids in length, often less than 100 amino acids in length, preferably less than 75 amino acids in length, and more preferably less than 50 amino acids in length. The protein sequence of the vaccine composition is selected because it has maximal number of epitopes contained within the sequence, i.e., it has a high concentration of epitopes. As noted herein, epitope motifs may be nested or overlapping (i.e., frame shifted relative to one another). For example, with f overlapping epitopes, two 9-mer epitopes and one 10-mer epitope can be present in a 10 amino acid peptide. Such a vaccine composition is administered for therapeutic or prophylactic purposes.

The vaccine composition will include, for example, three CTL epitopes from at least one HPV target antigen and at least one HTL epitope. This polyepitopic native sequence is administered either as a peptide or as a nucleic acid sequence which encodes the peptide. Alternatively, an analog can be made of this native sequence, whereby one or more of the epitopes comprise substitutions that alter the cross-reactivity and/or binding affinity properties of the polyepitopic peptide.

The embodiment of this example provides for the possibility that an as yet undiscovered aspect of immune system processing will apply to the native nested sequence and thereby facilitate the production of therapeutic or prophylactic immune response-inducing vaccine compositions. Additionally such an embodiment provides for the possibility of motif-bearing epitopes for an HLA makeup that is presently unknown. Furthermore, this embodiment (absent analogs) directs the immune response to multiple peptide sequences that are actually present in native HPV antigens thus avoiding the need to evaluate any junctional epitopes. Lastly, the embodiment provides an economy of scale when producing nucleic acid vaccine compositions.

Related to this embodiment, computer programs can be derived in accordance with principles in the art, which identify in a target sequence, the greatest number of epitopes per sequence length.

Example 15. Polyepitopic Vaccine Compositions From Multiple Antigens

The HPV peptide epitopes of the present invention are used in conjunction with peptide epitopes from other target tumor-associated antigens to create a vaccine composition that is useful for the prevention or treatment of cancer resulting from HPV infection in multiple patients.

For example, a vaccine composition can be provided as a single polypeptide that incorporates multiple epitopes from HPV antigens as well as tumor-associated antigens that are often expressed with a target cancer, *e.g.*, cervical cancer, associated with HPV infection, or can be administered as a composition comprising one or more discrete epitopes. Alternatively, the vaccine can be administered as a minigene construct or as dendritic cells which have been loaded with the peptide epitopes *in vitro*.

Example 16. Use of peptides to evaluate an immune response

Peptides of the invention may be used to analyze an immune response for the presence of specific CTL or HTL populations directed to HPV. Such an analysis may be performed in a manner as that described by Ogg *et al.*, *Science* 279:2103-2106, 1998. In the following example, peptides in accordance with the invention are used as a reagent for diagnostic or prognostic purposes, not as an immunogen.

In this example highly sensitive human leukocyte antigen tetrameric complexes ("tetramers") are used for a cross-sectional analysis of, for example, HPV HLA-A*0201-specific CTL frequencies from HLA A*0201-positive individuals at different stages of infection or following immunization using an HPV peptide containing an A*0201 motif. Tetrameric complexes are synthesized as described (Musey *et al.*, *N. Engl. J. Med.* 337:1267, 1997). Briefly, purified HLA heavy chain (A*0201 in this example) and β2-microglobulin are synthesized by means of a prokaryotic expression system. The heavy chain is modified by deletion of the transmembrane-cytosolic tail and COOH-terminal addition of a sequence containing a BirA enzymatic biotinylation site. The heavy chain, β2-microglobulin, and peptide are refolded by dilution. The 45-kD refolded product is isolated by fast protein liquid chromatography and then biotinylated by BirA in the presence of biotin (Sigma, St. Louis, Missouri), adenosine 5'triphosphate and magnesium. Streptavidin-phycoerythrin conjugate is added in a 1:4 molar ratio, and the tetrameric product is concentrated to 1 mg/ml. The resulting product is referred to as tetramer-phycoerythrin.

For the analysis of patient blood samples, approximately one million PBMCs are centrifuged at 300g for 5 minutes and resuspended in 50 μl of cold phosphate-buffered saline. Tri-color analysis is performed with the tetramer-phycoerythrin, along with anti-CD8-Tricolor, and anti-CD38. The PBMCs are incubated with tetramer and antibodies on ice for 30 to 60 min and then washed twice before formaldehyde fixation. Gates are applied to contain >99.98% of control samples. Controls for the tetramers include both A*0201-negative individuals and A*0201-positive uninfected donors. The percentage of cells stained with the tetramer is then determined by flow cytometry. The results indicate the number of cells in the PBMC sample that contain epitope-restricted CTLs, thereby readily indicating the

extent of immune response to the HPV epitope, and thus the stage of infection with HPV, the status of exposure to HPV, or exposure to a vaccine that elicits a protective or therapeutic response.

Example 17.   Use of Peptide Epitopes to Evaluate Recall Responses

5   The peptide epitopes of the invention are used as reagents to evaluate T cell responses, such as acute or recall responses, in patients. Such an analysis may be performed on patients who have recovered from infection, who are chronically infected with HPV, or who have been vaccinated with an HPV vaccine.

                For example, the class I restricted CTL response of persons who have been vaccinated

10   may be analyzed. The vaccine may be any HPV vaccine. PBMC are collected from vaccinated individuals and HLA typed. Appropriate peptide epitopes of the invention that, optimally, bear supermotifs to provide cross-reactivity with multiple HLA supertype family members, are then used for analysis of samples derived from individuals who bear that HLA type.

                PBMC from vaccinated individuals are separated on Ficoll-Histopaque density gradients

15   (Sigma Chemical Co., St. Louis, MO), washed three times in HBSS (GIBCO Laboratories), resuspended in RPMI-1640 (GIBCO Laboratories) supplemented with L-glutamine (2mM), penicillin (50U/ml), streptomycin (50 μg/ml), and Hepes (10mM) containing 10% heat-inactivated human AB serum (complete RPMI) and plated using microculture formats. A synthetic peptide comprising an epitope of the invention is added at 10 μg/ml to each well and HBV core 128-140 epitope is added at 1 μg/ml to each well as a

20   source of T cell help during the first week of stimulation.

                In the microculture format, 4×10^5 PBMC are stimulated with peptide in 8 replicate cultures in 96-well round bottom plate in 100 μl/well of complete RPMI. On days 3 and 10, 100 ul of complete RPMI and 20 U/ml final concentration of rIL-2 are added to each well. On day 7 the cultures are transferred into a 96-well flat-bottom plate and restimulated with peptide, rIL-2 and 10^5 irradiated (3,000

25   rad) autologous feeder cells. The cultures are tested for cytotoxic activity on day 14. A positive CTL response requires two or more of the eight replicate cultures to display greater than 10% specific ^{51}Cr release, based on comparison with uninfected control subjects as previously described (Rehermann, *et al.*, *Nature Med.* 2:1104,1108, 1996; Rehermann *et al., J. Clin. Invest.* 97:1655-1665, 1996; and Rehermann *et al. J. Clin. Invest.* 98:1432-1440, 1996).

30   Target cell lines are autologous and allogeneic EBV-transformed B-LCL that are either purchased from the American Society for Histocompatibility and Immunogenetics (ASHI, Boston, MA) or established from the pool of patients as described (Guilhot, *et al. J. Virol.* 66:2670-2678, 1992).

                Cytotoxicity assays are performed in the following manner. Target cells consist of either allogeneic HLA-matched or autologous EBV-transformed B lymphoblastoid cell line that are incubated

35   overnight with the synthetic peptide epitope of the invention at 10 μM, and labeled with 100 μCi of ^{51}Cr (Amersham Corp., Arlington Heights, IL) for 1 hour after which they are washed four times with HBSS.

                Cytolytic activity is determined in a standard 4-h, split well ^{51}Cr release assay using U-bottomed 96 well plates containing 3,000 targets/well. Stimulated PBMC are tested at effector/target (E/T) ratios of 20-50:1 on day 14. Percent cytotoxicity is determined from the formula: 100 x [(experimental

40   release-spontaneous release)/(maximum release-spontaneous release)]. Maximum release is determined by

lysis of targets by detergent (2% Triton X-100; Sigma Chemical Co., St. Louis, MO). Spontaneous release is <25% of maximum release for all experiments.

The results of such an analysis indicate the extent to which HLA-restricted CTL populations have been stimulated by previous exposure to HPV or an HPV vaccine.

The class II restricted HTL responses may also be analyzed. Purified PBMC are cultured in a 96-well flat bottom plate at a density of 1.5×10^5 cells/well and are stimulated with 10 μg/ml synthetic peptide, whole antigen, or PHA. Cells are routinely plated in replicates of 4-6 wells for each condition. After seven days of culture, the medium is removed and replaced with fresh medium containing 10U/ml IL-2. Two days later, 1 μCi ^{3}H-thymidine is added to each well and incubation is continued for an additional 18 hours. Cellular DNA is then harvested on glass fiber mats and analyzed for ^{3}H-thymidine incorporation. Antigen-specific T cell proliferation is calculated as the ratio of ^{3}H-thymidine incorporation in the presence of antigen divided by the ^{3}H-thymidine incorporation in the absence of antigen.

Example 18. Induction Of Specific CTL Response In Humans

A human clinical trial for an immunogenic composition comprising CTL and HTL epitopes of the invention is set up as an IND Phase I, dose escalation study and carried out as a randomized, double-blind, placebo-controlled trial. Such a trial is designed, for example, as follows:

A total of about 27 individuals are enrolled and divided into 3 groups:

Group I: 3 subjects are injected with placebo and 6 subjects are injected with 5 μg of peptide composition;

Group II: 3 subjects are injected with placebo and 6 subjects are injected with 50 μg peptide composition;

Group III: 3 subjects are injected with placebo and 6 subjects are injected with 500 μg of peptide composition.

After 4 weeks following the first injection, all subjects receive a booster inoculation at the same dosage.

The endpoints measured in this study relate to the safety and tolerability of the peptide composition as well as its immunogenicity. Cellular immune responses to the peptide composition are an index of the intrinsic activity of this peptide composition, and can therefore be viewed as a measure of biological efficacy. The following summarize the clinical and laboratory data that relate to safety and efficacy endpoints.

Safety: The incidence of adverse events is monitored in the placebo and drug treatment group and assessed in terms of degree and reversibility.

Evaluation of Vaccine Efficacy: For evaluation of vaccine efficacy, subjects are bled before and after injection. Peripheral blood mononuclear cells are isolated from fresh heparinized blood by Ficoll-Hypaque density gradient centrifugation, aliquoted in freezing media and stored frozen. Samples are assayed for CTL and HTL activity.

The vaccine is found to be both safe and efficacious.

Example 19. Phase II Trials In Patients Infected With HPV

Phase II trials are performed to study the effect of administering the CTL-HTL peptide compositions to patients having cancer associated with HPV infection. The main objectives of the trials are to determine an effective dose and regimen for inducing CTLs in HPV-infected patients with cancer, to

5   establish the safety of inducing a CTL and HTL response in these patients, and to see to what extent activation of CTLs improves the clinical picture of chronically infected HPV patients, as manifested by a reduction in viral load, *e.g.*, the reduction and/or shrinking of lesions. Such a study is designed, for example, as follows:

The studies are performed in multiple centers. The trial design is an open-label,

10 uncontrolled, dose escalation protocol wherein the peptide composition is administered as a single dose followed six weeks later by a single booster shot of the same dose. The dosages are 50, 500 and 5,000 micrograms per injection. Drug-associated adverse effects (severity and reversibility) are recorded.

There are three patient groupings. The first group is injected with 50 micrograms of the peptide composition and the second and third groups with 500 and 5,000 micrograms of peptide

15 composition, respectively. The patients within each group range in age from 21-65 and represent diverse ethnic backgrounds. All of them are infected with HPV and are HIV, HCV, HBV and delta hepatitis virus (HDV) negative, but are positive for HPV DNA as monitored by PCR.

Clinical manifestations or antigen-specific T-cell responses are monitored to assess the effects of administering the peptide compositions. The vaccine composition is found to be both safe and

20 efficacious in the treatment of HPV infection.

Example 20. Induction of CTL Responses Using a Prime Boost Protocol

A prime boost protocol similar in its underlying principle to that used to evaluate the efficacy of a DNA vaccine in transgenic mice, such as described in Example 12, can also be used for the

25 administration of the vaccine to humans. Such a vaccine regimen can include an initial administration of, for example, naked DNA followed by a boost using recombinant virus encoding the vaccine, or recombinant protein/polypeptide or a peptide mixture administered in an adjuvant.

For example, the initial immunization may be performed using an expression vector, such as that constructed in Example 11, in the form of naked nucleic acid administered IM (or SC or ID) in the

30 amounts of 0.5-5 mg at multiple sites. The nucleic acid (0.1 to 1000 μg) can also be administered using a gene gun. Following an incubation period of 3-4 weeks, a booster dose is then administered. The booster can be recombinant fowlpox virus administered at a dose of $5\text{-}10^7$ to 5×10^9 pfu. An alternative recombinant virus, such as an MVA, canarypox, adenovirus, or adeno-associated virus, can also be used for the booster, or the polyepitopic protein or a mixture of the peptides can be administered. For evaluation of vaccine

35 efficacy, patient blood samples will be obtained before immunization as well as at intervals following administration of the initial vaccine and booster doses of the vaccine. Peripheral blood mononuclear cells are isolated from fresh heparinized blood by Ficoll-Hypaque density gradient centrifugation, aliquoted in freezing media and stored frozen. Samples are assayed for CTL and HTL activity.

Analysis of the results indicates that a magnitude of response sufficient to achieve

40 protective immunity against HPV is generated.

Example 21. Administration of Vaccine Compositions Using Dendritic Cells (DC)

        Vaccines comprising peptide epitopes of the invention can be administered using APCs,

5 or "professional" APCs such as DC. In this example, the peptide-pulsed DC are administered to a patient to stimulate a CTL response *in vivo*. In this method, dendritic cells are isolated, expanded, and pulsed with a vaccine comprising peptide CTL and HTL epitopes of the invention. The dendritic cells are infused back into the patient to elicit CTL and HTL responses *in vivo*. The induced CTL and HTL then destroy or facilitate destruction of the specific target cells that bear the proteins from which the epitopes in the vaccine are derived.

10   For example, a cocktail of epitope-bearing peptides is administered *ex vivo* to PBMC, or isolated DC therefrom. A pharmaceutical to facilitate harvesting of DC can be used, such as Progenipoietin™ (Monsanto, St. Louis, MO) or GM-CSF/IL-4. After pulsing the DC with peptides and prior to reinfusion into patients, the DC are washed to remove unbound peptides.

        As appreciated clinically, and readily determined by one of skill based on clinical

15 outcomes, the number of DC reinfused into the patient can vary (*see, e.g., Nature Med.* 4:328, 1998; *Nature Med.* 2:52, 1996 and *Prostate* 32:272, 1997). Although 2-50 x 10^6 DC per patient are typically administered, larger number of DC, such as 10^7 or 10^8 can also be provided. Such cell populations typically contain between 50-90% DC.

        In some embodiments, peptide-loaded PBMC are injected into patients without

20 purification of the DC. For example, PBMC containing DC generated after treatment with an agent such as Progenipoietin™ are injected into patients without purification of the DC. The total number of PBMC that are administered often ranges from 10^8 to 10^{10}. Generally, the cell doses injected into patients is based on the percentage of DC in the blood of each patient, as determined, for example, by immunofluorescence analysis with specific anti-DC antibodies. Thus, for example, if Progenipoietin™ mobilizes 2% DC in the

25 peripheral blood of a given patient, and that patient is to receive 5 x 10^6 DC, then the patient will be injected with a total of 2.5 x 10^8 peptide-loaded PBMC. The percent DC mobilized by an agent such as Progenipoietin™ is typically estimated to be between 2-10%, but can vary as appreciated by one of skill in the art.

30 *Ex vivo activation of CTL/HTL responses*

        Alternatively, *ex vivo* CTL or HTL responses to HPV antigens can be induced by incubating in tissue culture the patient's, or genetically compatible, CTL or HTL precursor cells together with a source of APC, such as DC, and the appropriate immunogenic peptides. After an appropriate incubation time (typically about 7-28 days), in which the precursor cells are activated and expanded into

35 effector cells, the cells are infused back into the patient, where they will destroy (CTL) or facilitate destruction (HTL) of their specific target cells, *i.e.*, tumor cells.

Example 22. Alternative Method of Identifying Motif-Bearing Peptides

        Another method of identifying motif-bearing peptides is to elute them from cells bearing

40 defined MHC molecules. For example, EBV transformed B cell lines used for tissue typing have been

extensively characterized to determine which HLA molecules they express. In certain cases these cells express only a single type of HLA molecule. These cells can be infected with a pathogenic organism or transfected with nucleic acids that express the antigen of interest, *e.g.* HPV regulatory or structural proteins.

5   Peptides produced by endogenous antigen processing of peptides produced consequent to infection (or as a result of transfection) will then bind to HLA molecules within the cell and be transported and displayed on the cell surface. Peptides are then eluted from the HLA molecules by exposure to mild acid conditions and their amino acid sequence determined, *e.g.*, by mass spectral analysis (*e.g.*, Kubo *et al.*, *J. Immunol.* 152:3913, 1994). Because the majority of peptides that bind a particular HLA molecule are motif-bearing, this is an alternative modality for obtaining the motif-bearing peptides correlated with the particular HLA

10   molecule expressed on the cell.

Alternatively, cell lines that do not express endogenous HLA molecules can be transfected with an expression construct encoding a single HLA allele. These cells can then be used as described, *i.e.*, they can be infected with a pathogen or transfected with nucleic acid encoding an antigen of interest to isolate peptides corresponding to the pathogen or antigen of interest that have been presented on

15   the cell surface. Peptides obtained from such an analysis will bear motif(s) that correspond to binding to the single HLA allele that is expressed in the cell.

As appreciated by one in the art, one can perform a similar analysis on a cell bearing more than one HLA allele and subsequently determine peptides specific for each HLA allele expressed. Moreover, one of skill would also recognize that means other than infection or transfection, such as loading

20   with a protein antigen, can be used to provide a source of antigen to the cell.

The above examples are provided to illustrate the invention but not to limit its scope. For example, the human terminology for the Major Histocompatibility Complex, namely HLA, is used throughout this document. It is to be appreciated that these principles can be extended to other species as

25   well. Thus, other variants of the invention will be readily apparent to one of ordinary skill in the art and are encompassed by the appended claims. All publications, patents, and patent application cited herein are hereby incorporated by reference for all purposes.

TABLE I

SUPERMOTIFS	POSITION 2 (Primary Anchor)	POSITION 3 (Primary Anchor)	POSITION C Terminus (Primary Anchor)
A1	T, I, *L, V, M, S*		F, W, Y
A2	L, I, V, M, *A, T, Q*		I, V, *M, A, T, L*
A3	V, S, M, A, *T, L, I*		R,K
A24	Y, F, *W, I, V, L, M, T*		F, I, *Y, W, L, M*
B7	P		V, I, L, F, *M, W, Y, A*
B27	R, H, K		F, Y, L, *W, M, I, V, A*
B44	E, *D*		F, W, L, I, M, V, A
B58	A, T, S		F, W, Y, *L, I, V, M, A*
B62	Q, L, *I, V, M, P*		F, W, Y, *M, I, V, L, A*
MOTIFS			
A1	T, S, M		Y
A1		D, E, *A, S*	Y
A2.1	L, M, *V, Q, I, A, T*		V, *L, I, M, A, T*
A3	L, M, V, I, S, A, T, F, *C, G, D*		K, Y, R, *H, F, A*
A11	V, T, M, L, I, S, A, G, N, *C, D, F*		K, *R, Y, H*
A24	Y, F, W, *M*		F, L, I, W
A*3101	M, V, T, *A ,L, I, S*		R, *K*
A*3301	M, V, A, L, F, *I, S, T*		R, K
A*6801	A, V, T, *M, S, L, I*		R, K
B*0702	P		L, M, F, *W, Y, A, I, V*
B*3501	P		L, M, F, W, Y, *I, V, A*
B51	P		L, I, V, F, *W, Y, A, M*
B*5301	P		I, M, F, W, Y, *A, L, V*
B*5401	P		A, T, I, V, *L, M, F, W, Y*

Bolded residues are preferred, italicized residues are less preferred: A peptide is considered motif-bearing if it has primary anchors at each primary anchor position for a motif or supermotif as specified in the above table.

TABLE Ia

SUPERMOTIFS	POSITION 2 (Primary Anchor)	POSITION 3 (Primary Anchor)	POSITION C Terminus (Primary Anchor)
A1	T, **I**, *L, V, M, S*		F, W, Y
A2	*V, Q, A, T*		**I, V,** *L, M, A, T*
A3	**V, S, M, A,** *T, L, I*		**R, K**
A24	**Y, F,** *W, I, V, L, M, T*		**F, I,** *Y, W, L, M*
B7	**P**		**V, I, L, F,** *M, W, Y, A*
B27	**R, H, K**		**F, Y, L,** *W, M, I, V, A*
B58	**A, T, S**		**F, W, Y,** *L, I, V, M, A*
B62	**Q, L,** *I, V, M, P*		**F, W, Y,** *M, I, V, L, A*
MOTIFS			
A1	**T, S, M**		**Y**
A1		**D, E,** *A, S*	**Y**
A2.1	*V, Q, A, T* *		**V,** *L, I, M, A, T*
A3.2	**L, M, V, I, S, A, T, F,** *C, G, D*		**K, Y, R,** *H, F, A*
A11	**V, T, M, L, I, S, A, G, N,** *C, D, F*		**K,** *R, H, Y*
A24	**Y** ,**F, W**		**F, L, I, W**

*If 2 is V, or Q, the C-term is not L

Bolded residues are preferred, italicized residues are less preferred: A peptide is considered motif-bearing if it has primary anchors at each primary anchor position for a motif or supermotif as specified in the above table.

TABLE II

SUPERMOTIFS		1	2	3	4	5	6	7	8	C-terminus
A1*			1° Anchor T,I,L,V,M,S							1° Anchor F,W,Y
A2			1° Anchor L,I,V,M,A,T,Q							1° Anchor L,I,V,M,A,T
A3	preferred		1° Anchor V,S,M,A,T, L,I	Y,F,W, (4/5)			Y,F,W, (3/5)	Y,F,W, (4/5)	P, (4/5)	1° Anchor R,K
	deleterious	D,E (3/5); P, (5/5)		D,E, (4/5)						
A24	preferred		1° Anchor Y,F,W,I,V, L,M,T	F,W,Y (4/5)						1° Anchor F,I,Y,W,L,M
B7	preferred	F,W,Y (5/5) L,I,V,M, (3/5)	1° Anchor P	F,W,Y (4/5)					F,W,Y, (3/5)	1° Anchor V,I,L,F,M,W,Y,A
	deleterious	D,E (3/5); P(5/5); G(4/5); A(3/5); Q,N, (3/5)				D,E, (3/5)	G, (4/5)	Q,N, (4/5)	D,E, (4/5)	
B27			1° Anchor R,H,K							1° Anchor F,Y,L,W,M,I,Y,A
B44			1° Anchor E,D							1° Anchor F,W,Y,L,I,M,V,A
B58			1° Anchor A,T,S							1° Anchor F,W,Y,L,I,V,M,A
B62			1° Anchor Q,L,I,V,M, P							1° Anchor F,W,Y,M,I,V,L,A

MOTIFS

				POSITION					
	1	2	3	4	5	6	7	8	C-terminus
A2 9-mer preferred	G,F,Y,W,	1°Anchor S,T,M,	D,E,A,	Y,F,W,		P,	D,E,Q,N,	Y,F,W,	1°Anchor Y
deleterious	D,E,		R,H,K,L,I,V M,P,	A,	G,	A,			
A1 9-mer preferred	G,R,H,K	A,S,T,C,L,I V,M,	1°Anchor D,E,A,S	G,S,T,C,		A,S,T,C,	L,I,V,M,	D,E,	1°Anchor Y
deleterious	A	R,H,K,D,E, P,Y,F,W,		D,E,	P,Q,N,	R,H,K,	P,G,	G,P,	

					POSITION					
	1	2	3	4	5	6	7	8	9 or C-terminus	C-terminus
A1 10-mer preferred	Y,F,W,	1°Anchor S,T,M,	D,E,A,Q,N,	A,	Y,F,W,Q,N,		P,A,S,T,C,	G,D,E,	P,	1°Anchor Y
deleterious	G,P,	R,H,K,G,L,I, V,M,		D,E,	R,H,K, ·	Q,N,A	R,H,K,Y,F, W,	R,H,K,	A	
A1 10-mer preferred	Y,F,W,	S,T,C,L,I,V, M,	1°Anchor D,E,A,S	A,	Y,F,W,		P,G,	G,	Y,F,W,	1°Anchor Y
deleterious	R,H,K,	R,H,K,D,E, P,Y,F,W,			P,	G,		P,R,H,K,	Q,N,	
A2.1 9-mer preferred	Y,F,W,	1°Anchor L,M,I,V,Q, A,T		S,T,C,	Y,F,W,		A,	P	1°Anchor V,L,I,M,A,T	
deleterious	D,E,P,		D,E,R,K,H			R,K,H	D,E,R,K,H			
A2.1 10-mer preferred	A,Y,F,W,	1°Anchor L,M,I,V,Q, A,T	L,V,I,M,	G,	P,	G,		F,Y,W,L, V,I,M,	D,E,R,K, H,	1°Anchor V,L,I,M,A,T
deleterious	D,E,P,		D,E,	R,K,H,A,	P,		R,K,H,	D,E,R,K, H,	R,K,H,	

POSITION

		1	2	3	4	5	6	7	8	8 or C-terminus 1° Anchor	C-terminus
A3	preferred	R,H,K,	1° Anchor L,M,V,I,S, A,T,F,C,G D	Y,F,W,	P,R,H,K,Y, F,W,	A,	Y,F,W,		P,	K,Y,R,H,F,A	
	deleterious	D,E,P,		D,E							
A11	preferred	A,	1° Anchor V,T,L,M,I, S,A,G,N,C, D,F	Y,F,W,	Y,F,W,	A,	Y,F,W,	Y,F,W,	P,	K,R,Y,H	
	deleterious	D,E,P,					A		G,		
A24 9-mer	preferred	Y,F,W,R,H,K,	1° Anchor Y,F,W,M		S,T,C		Y,F,W,	Y,F,W,	Y,F,W,	F,L,I,W	
	deleterious	D,E,G,		D,E	G,	Q,N,P,	D,E,R,H,K,	G,	A,Q,N,		
A24 10-mer	preferred		1° Anchor Y,F,W,M		P,	Y,F,W,P,	P,				1° Anchor F,L,I,W
	deleterious			G,D,E	Q,N	R,H,K	D,E	A	Q,N,	D,E,A,	
A3101	preferred	R,H,K,	1° Anchor M,V,T,A,L, I,S	Y,F,W,	P,		Y,F,W,	Y,F,W,	A,P,	R,K	
	deleterious	D,E,P,		D,E		A,D,E,	D,E	D,E	D,E,		

		1	2	3	4	5	6	7	8	9 or C-terminus
POSITION										
A3301	preferred		1°Anchor M,V,A,L,F, I,S,T	Y,F,W				A,Y,F,W		1°Anchor R,K
	deleterious	G,P		D,E						
A6801	preferred	Y,F,W,S,T,C,	1°Anchor A,V,T,M,S, L,I			Y,F,W,L,I, V,M		Y,F,W,	P,	1°Anchor R,K
	deleterious	G,P,		D,E,G,		R,H,K,			A,	
B0702	preferred	R,H,K,F,W,Y,	1°Anchor P	R,H,K,		R,H,K,	R,H,K,	R,H,K,	P,A,	1°Anchor L,M,F,W,Y,A, I,V
	deleterious	D,E,Q,N,P,		D,E,P,	D,E,	D,E,	G,D,E,	Q,N,	D,E,	
B3501	preferred	F,W,Y,L,I,V,M,	1°Anchor P	F,W,Y.				F,W,Y,		1°Anchor L,M,F,W,Y,I, V,A
	deleterious	A,G,P,				G,	G,			

					POSITION					
	1	2	3	4	5	6	7	8	9 or C-terminus	C-terminus
B51 preferred	L,I,V,M,F,W,Y,	1° Anchor P	F,W,Y,	S,T,C,	F,W,Y,		G,	F,W,Y,	1° Anchor L,I,V,F,W, Y,A,M	
deleterious	A,G,P,D,E,R,H,K, S,T,C,				D,E,	G,	D,E,Q,N,	G,D,E,		
B5301 preferred	L,I,V,A,F,W,Y,	1° Anchor P	F,W,Y,	S,T,C,	F,W,Y,		L,I,V,M,F, W,Y,	F,W,Y,	1° Anchor I,M,F,W,Y, A,L,V	
deleterious	A,G,P,Q,N,					G,	R,H,K,Q,N,	D,E,		
B5401 preferred	F,W,Y,	1° Anchor P	F,W,Y,L,I,V M,		L,I,V,M,		A,L,I,V,M,	F,W,Y,A,P,	1° Anchor A,I,L,V,L, M,F,W,Y	
deleterious	G,P,Q,N,D,E,		G,D,E,S,T,C,		R,H,K,D,E,		Q,N,D,G,E,	D,E,		

Italicized residues indicate less preferred or "tolerated" residues.
The information in Table II is specific for 9-mers unless otherwise specified.
Secondary anchor specificities are designated for each position independently.

SF 1104323 v1

Table III

POSITION

MOTIFS		1° anchor 1	2	3	4	5	1° anchor 6	7	8	9
DR4	preferred	F, M, Y, L, I, V, W,	M,	T,		L,	V, S, T, C, P, A, I, I, M,	M, H,		M, H
	deleterious				W,		R,			W, D, E
DR1	preferred	M, F, L, I, V, W, Y,			P, A, M, Q,		V, M, A, T, S, P, L, I, C,	M,		A, V, M
	deleterious		C	C, H	F, D	C, W, D		G, D, E,	D	
DR7	preferred	M, F, L, I, V, W, Y,	M,	W,	A,		I, V, M, S, A, C, T, P, L,	M,		I, V
	deleterious		C,		G,			G, R, D,	N	G
DR Supermotif		M, F, L, I, V, W, Y,					V, M, S, T, A, C, P, L, I,			

DR3 MOTIFS		1° anchor 1	2	3	1° anchor 4	5	1° anchor 6
motif a	preferred	L, I, V, M, F, Y,			D		
motif b	preferred	L, I, V, M, F, A, Y,			D, N, Q, E, S, T		K, R, H

Italicized residues indicate less preferred or "tolerated" residues. Secondary anchor specificities are designated for each position independently.

Table IV: HLA Class I Standard Peptide Binding Affinity.

ALLELE	STANDARD PEPTIDE	SEQUENCE	SEQ ID NO:	STANDARD BINDING AFFINITY (nM)
A*0101	944.02	YLEPAIAKY	51487	25
A*0201	941.01	FLPSDYFPSV	51488	5.0
A*0202	941.01	FLPSDYFPSV	51488	4.3
A*0203	941.01	FLPSDYFPSV	51488	10
A*0205	941.01	FLPSDYFPSV	51488	4.3
A*0206	941.01	FLPSDYFPSV	51488	3.7
A*0207	941.01	FLPSDYFPSV	51488	23
A*6802	1072.34	YVIKVSARV	51489	8.0
A*0301	941.12	KVFPYALINK	51490	11
A*1101	940.06	AVDLYHFLK	51491	6.0
A*3101	941.12	KVFPYALINK	51490	18
A*3301	1083.02	STLPETYVVRR	51492	29
A*6801	941.12	KVFPYALINK	51490	8.0
A*2402	979.02	AYIDNYNKF	51493	12
B*0702	1075.23	APRTLVYLL	51494	5.5
B*3501	1021.05	FPFKYAAAF	51495	7.2
B51	1021.05	FPFKYAAAF	51495	5.5
B*5301	1021.05	FPFKYAAAF	51495	9.3
B*5401	1021.05	FPFKYAAAF	51495	10

Table V.   HLA Class II Standard Peptide Binding Affinity.

Allele	Nomenclature	Standard Peptide	Sequence	SEQ ID NO:	Binding Affinity (nM)
DRB1*0101	DR1	515.01	PKYVKQNTLKLAT	51496	5.0
DRB1*0301	DR3	829.02	YKTIAFDEEARR	51497	300
DRB1*0401	DR4w4	515.01	PKYVKQNTLKLAT	51496	45
DRB1*0404	DR4w14	717.01	YARFQSQTTLKQKT	51498	.50
DRB1*0405	DR4w15	717.01	YARFQSQTTLKQKT	51498	38
DRB1*0701	DR7	553.01	QYIKANSKFIGITE	51499	25
DRB1*0802	DR8w2	553.01	QYIKANSKFIGITE	51499	49
DRB1*0803	DR8w3	553.01	QYIKANSKFIGITE	51499	1600
DRB1*0901	DR9	553.01	QYIKANSKFIGITE	51499	75
DRB1*1101	DR5w11	553.01	QYIKANSKFIGITE	51499	20
DRB1*1201	DR5w12	1200.05	EALIHQLKINPYVLS	51500	298
DRB1*1302	DR6w19	650.22	QYIKANAKFIGITE	51499	3.5
DRB1*1501	DR2w2β1	507.02	GRTQDENPVVHFFKNIV TPRTPPP	51501	9.1
DRB3*0101	DR52a	511	NGQIGNDPNRDIL	51502	470
DRB4*0101	DRw53	717.01	YARFQSQTTLKQKT	51498	58
DRB5*0101	DR2w2β2	553.01	QYIKANSKFIGITE	51499	20

Table VI

HLA-supertype	Allele-specific HLA-supertype members	
	Verified[a]	Predicted[b]
A1	A*0101, A*2501, A*2601, A*2602, A*3201	A*0102, A*2604, A*3601, A*4301, A*8001
A2	A*0201, A*0202, A*0203, A*0204, A*0205, A*0206, A*0207, A*0209, A*0214, A*6802, A*6901	A*0208, A*0210, A*0211, A*0212, A*0213
A3	A*0301, A*1101, A*3101, A*3301, A*6801	A*0302, A*1102, A*2603, A*3302, A*3303, A*3401, A*3402, A*6601, A*6602, A*7401
A24	A*2301, A*2402, A*3001	A*2403, A*2404, A*3002, A*3003
B7	B*0702, B*0703, B*0704, B*0705, B*1508, B*3501, B*3502, B*3503, B*3503, B*3504, B*3505, B*3506, B*3507, B*3508, B*5101, B*5102, B*5103, B*5104, B*5105, B*5301, B*5401, B*5501, B*5502, B*5601, B*5602, B*6701, B*7801	B*1511, B*4201, B*5901
B27	B*1401, B*1402, B*1509, B*2702, B*2703, B*2704, B*2705, B*2706, B*3801, B*3901, B*3902, B*7301	B*2701, B*2707, B*2708, B*3802, B*3903, B*3904, B*3905, B*4801, B*4802, B*1510, B*1518, B*1503
B44	B*1801, B*1802, B*3701, B*4402, B*4403, B*4404, B*4001, B*4002, B*4006	B*4101, B*4501, B*4701, B*4901, B*5001
B58	B*5701, B*5702, B*5801, B*5802, B*1516, B*1517	B*1301, B*1302, B*1504, B*1505, B*1506, B*1507,
B62	B*1501, B*1502, B*1513, B*5201	B*1515, B*1520, B*1521, B*1512, B*1514, B*1510

a.   Verified alleles include alleles whose specificity has been determined by pool sequencing analysis, peptide binding assays, or by analysis of the sequences of CTL epitopes.

b.   Predicted alleles are alleles whose specificity is predicted on the basis of B and F pocket structure to overlap with the supertype specificity.

Table VII
HLA-A1 Supermotif Peptides

1	2	3	4
HPV16	E1	10	206
HPV16	E1	8	524
HPV16	E1	9	82
HPV16	E1	11	353
HPV16	E1	10	368
HPV16	E1	11	41
HPV16	E1	8	372
HPV16	E1	10	249
HPV16	E1	9	43
HPV16	E1	9	384
HPV16	E1	10	603
HPV16	E1	11	603
HPV16	E1	8	356
HPV16	E1	10	356
HPV16	E1	9	63
HPV16	E1	9	152
HPV16	E1	9	331
HPV16	E1	8	51
HPV16	E1	9	493
HPV16	E1	9	445
HPV16	E1	8	456
HPV16	E1	11	453
HPV16	E1	8	219
HPV16	E1	9	586
HPV16	E1	8	501
HPV16	E1	9	501
HPV16	E1	11	466
HPV16	E1	9	325
HPV16	E1	11	519
HPV16	E1	10	272
HPV16	E1	9	163
HPV16	E1	8	571
HPV16	E1	8	12
HPV16	E1	9	12
HPV16	E1	11	216
HPV16	E1	9	263
HPV16	E1	8	348
HPV16	E1	11	329
HPV16	E1	8	326
HPV16	E1	9	369
HPV16	E1	11	369
HPV16	E1	10	311
HPV16	E1	11	311
HPV16	E1	8	610
HPV16	E1	11	483
HPV16	E1	10	227
HPV16	E1	11	323
HPV16	E1	10	252
HPV16	E1	8	254
HPV16	E1	9	357
HPV16	E1	11	48
HPV16	E1	10	583
HPV16	E1	9	207
HPV16	E1	10	520
HPV16	E1	10	454
HPV16	E1	9	420
HPV16	E1	9	273
HPV16	E1	10	567
HPV16	E1	10	600
HPV16	E1	8	441
HPV16	E1	10	419
HPV16	E1	10	118
HPV16	E1	8	343
HPV16	E1	10	125
HPV16	E1	11	582
HPV16	E1	8	313
HPV16	E1	9	313
HPV16	E1	10	313
HPV16	E1	8	432
HPV16	E1	9	250
HPV16	E1	10	484
HPV16	E1	8	421
HPV16	E1	8	314
HPV16	E1	9	314
HPV16	E1	11	231
HPV16	E1	9	253
HPV16	E1	11	498
HPV16	E1	11	345
HPV16	E1	11	443
HPV16	E1	10	217
HPV16	E1	9	584
HPV16	E1	11	584
HPV16	E1	8	274
HPV16	E1	11	261
HPV16	E1	9	578
HPV16	E1	11	578
HPV16	E2	11	331
HPV16	E2	11	41
HPV16	E2	8	314
HPV16	E2	11	309
HPV16	E2	8	124
HPV16	E2	11	124
HPV16	E2	8	25
HPV16	E2	9	25
HPV16	E2	9	263
HPV16	E2	9	338
HPV16	E2	11	22
HPV16	E2	10	74
HPV16	E2	8	80
HPV16	E2	11	168
HPV16	E2	9	163
HPV16	E2	9	35
HPV16	E2	10	35
HPV16	E2	8	193
HPV16	E2	10	332
HPV16	E2	9	329
HPV16	E2	9	354
HPV16	E2	11	77
HPV16	E2	9	84
HPV16	E2	8	296
HPV16	E2	10	296
HPV16	E2	8	127
HPV16	E2	11	9
HPV16	E2	10	106
HPV16	E2	8	76
HPV16	E2	8	151
HPV16	E2	9	151
HPV16	E2	10	191
HPV16	E2	8	37

Table VII
HLA-A1 Supermotif Peptides

HPV16	E2	10	23	HPV16	E6	10	79
HPV16	E2	11	23	HPV16	E6	9	44
HPV16	E2	11	261	HPV16	E6	11	44
HPV16	E2	11	144	HPV16	E6	8	43
HPV16	E2	8	355	HPV16	E6	10	43
HPV16	E2	10	78	HPV16	E6	11	89
HPV16	E2	9	297	HPV16	E6	11	29
HPV16	E2	10	93	HPV16	E6	10	77
HPV16	E2	8	334	HPV16	E7	10	14
HPV16	E2	10	310	HPV16	E7	8	4
HPV16	E2	11	128	HPV16	E7	8	18
HPV16	E2	9	146	HPV16	L1	9	373
HPV16	E2	10	146	HPV16	L1	11	292
HPV16	E2	9	192	HPV16	L1	10	251
HPV16	E2	9	333	HPV16	L1	9	249
HPV16	E2	10	145	HPV16	L1	11	484
HPV16	E2	11	145	HPV16	L1	8	154
HPV16	E2	8	147	HPV16	L1	9	228
HPV16	E2	9	147	HPV16	L1	8	17
HPV16	E2	11	92	HPV16	L1	9	17
HPV16	E2	8	312	HPV16	L1	9	378
HPV16	E2	10	312	HPV16	L1	8	474
HPV16	E2	8	131	HPV16	L1	10	5
HPV16	E2	9	159	HPV16	L1	8	481
HPV16	E2	10	159	HPV16	L1	9	348
HPV16	E5	10	54	HPV16	L1	8	499
HPV16	E5	9	7	HPV16	L1	11	323
HPV16	E5	11	5	HPV16	L1	11	307
HPV16	E5	9	60	HPV16	L1	9	438
HPV16	E5	9	72	HPV16	L1	9	22
HPV16	E5	9	64	HPV16	L1	8	102
HPV16	E5	8	43	HPV16	L1	10	102
HPV16	E5	10	51	HPV16	L1	11	418
HPV16	E5	8	61	HPV16	L1	11	86
HPV16	E5	8	73	HPV16	L1	8	374
HPV16	E5	9	42	HPV16	L1	11	11
HPV16	E5	9	11	HPV16	L1	10	407
HPV16	E5	8	32	HPV16	L1	11	406
HPV16	E5	11	47	HPV16	L1	11	151
HPV16	E5	10	48	HPV16	L1	10	90
HPV16	E5	11	70	HPV16	L1	8	46
HPV16	E5	9	31	HPV16	L1	8	68
HPV16	E5	10	41	HPV16	L1	9	68
HPV16	E5	8	8	HPV16	L1	10	409
HPV16	E5	10	10	HPV16	L1	10	87
HPV16	E5	11	40	HPV16	L1	11	226
HPV16	E5	11	9	HPV16	L1	11	263
HPV16	E5	8	50	HPV16	L1	9	325
HPV16	E5	11	50	HPV16	L1	8	311
HPV16	E5	10	63	HPV16	L1	8	421
HPV16	E6	9	68	HPV16	L1	10	421
HPV16	E6	10	68	HPV16	L1	11	247
HPV16	E6	10	58	HPV16	L1	8	466
HPV16	E6	11	73	HPV16	L1	11	43
HPV16	E6	8	32	HPV16	L1	8	331
HPV16	E6	8	92	HPV16	L1	8	280
HPV16	E6	8	125	HPV16	L1	10	100
HPV16	E6	9	80	HPV16	L1	9	67
HPV16	E6	9	59	HPV16	L1	10	67
HPV16	E6	8	79	HPV16	L1	8	253

Table VII
HLA-A1 Supermotif Peptides

HPV16	L1	11	28	HPV16	L2	9	429

HPV16	L1	11	28	HPV16	L2	9	429
HPV16	L1	10	419	HPV16	L2	10	124
HPV16	L1	10	324	HPV16	L2	8	386
HPV16	L1	10	308	HPV16	L2	11	383
HPV16	L1	11	308	HPV16	L2	10	172
HPV16	L1	9	422	HPV16	L2	9	358
HPV16	L1	8	423	HPV16	L2	8	221
HPV16	L1	8	439	HPV16	L2	11	44
HPV16	L1	9	408	HPV16	L2	8	342
HPV16	L1	11	327	HPV16	L2	9	234
HPV16	L1	11	376	HPV16	L2	11	9
HPV16	L1	9	252	HPV16	L2	8	319
HPV16	L1	11	65	HPV16	L2	9	319
HPV16	L1	8	379	HPV16	L2	10	319
HPV16	L1	11	379	HPV16	L2	10	274
HPV16	L1	10	264	HPV16	L2	10	360
HPV16	L1	11	264	HPV16	L2	9	125
HPV16	L1	9	91	HPV16	L2	11	104
HPV16	L1	10	44	HPV16	L2	8	107
HPV16	L1	8	326	HPV16	L2	10	184
HPV16	L1	9	30	HPV16	L2	9	185
HPV16	L1	9	260	HPV16	L2	8	186
HPV16	L1	8	7	HPV16	L2	10	384
HPV16	L1	8	389	HPV16	L2	9	40
HPV16	L1	8	275	HPV16	L2	9	438
HPV16	L1	8	53	HPV16	L2	10	438
HPV16	L1	9	53	HPV16	L2	8	399
HPV16	L2	11	356	HPV16	L2	8	359
HPV16	L2	11	293	HPV16	L2	11	359
HPV16	L2	8	261	HPV16	L2	9	295
HPV16	L2	10	340	HPV16	L2	8	156
HPV16	L2	11	242	HPV16	L2	9	398
HPV16	L2	9	259	HPV16	L2	9	244
HPV16	L2	10	259	HPV16	L2	11	153
HPV16	L2	10	364	HPV16	L2	10	154
HPV16	L2	10	63	HPV16	L2	9	106
HPV16	L2	11	218	HPV16	L2	9	155
HPV16	L2	8	65	HPV16	L2	10	393
HPV16	L2	8	439	HPV16	L2	10	437
HPV16	L2	9	439	HPV16	L2	11	437
HPV16	L2	10	45	HPV18	E1	10	213
HPV16	L2	11	45	HPV18	E1	11	526
HPV16	L2	10	243	HPV18	E1	11	40
HPV16	L2	8	250	HPV18	E1	8	531
HPV16	L2	8	430	HPV18	E1	9	531
HPV16	L2	10	105	HPV18	E1	11	216
HPV16	L2	10	248	HPV18	E1	10	437
HPV16	L2	9	318	HPV18	E1	9	240
HPV16	L2	10	318	HPV18	E1	8	363
HPV16	L2	11	318	HPV18	E1	10	363
HPV16	L2	10	39	HPV18	E1	9	391
HPV16	L2	8	323	HPV18	E1	10	637
HPV16	L2	11	427	HPV18	E1	9	42
HPV16	L2	9	249	HPV18	E1	10	610
HPV16	L2	11	183	HPV18	E1	11	610
HPV16	L2	10	294	HPV18	E1	9	62
HPV16	L2	11	454	HPV18	E1	10	375
HPV16	L2	8	276	HPV18	E1	8	379
HPV16	L2	11	273	HPV18	E1	9	587
HPV16	L2	10	397	HPV18	E1	9	338

Table VII
HLA-A1 Supermotif Peptides

HPV18 E1	8	50	HPV18 E1	9	591
HPV18 E1	9	500	HPV18 E1	11	591
HPV18 E1	11	460	HPV18 E1	11	505
HPV18 E1	8	463	HPV18 E1	9	81
HPV18 E1	10	399	HPV18 E1	9	280
HPV18 E1	9	452	HPV18 E1	8	339
HPV18 E1	8	226	HPV18 E1	9	585
HPV18 E1	8	130	HPV18 E1	11	585
HPV18 E1	8	508	HPV18 E2	10	82
HPV18 E1	9	508	HPV18 E2	10	154
HPV18 E1	11	223	HPV18 E2	11	154
HPV18 E1	8	11	HPV18 E2	11	132
HPV18 E1	9	11	HPV18 E2	10	14
HPV18 E1	10	473	HPV18 E2	8	156
HPV18 E1	10	279	HPV18 E2	9	156
HPV18 E1	10	249	HPV18 E2	8	29
HPV18 E1	9	270	HPV18 E2	9	29
HPV18 E1	11	352	HPV18 E2	8	315
HPV18 E1	11	336	HPV18 E2	11	26
HPV18 E1	10	506	HPV18 E2	9	354
HPV18 E1	11	506	HPV18 E2	11	104
HPV18 E1	10	461	HPV18 E2	9	161
HPV18 E1	10	590	HPV18 E2	9	338
HPV18 E1	8	439	HPV18 E2	9	329
HPV18 E1	10	318	HPV18 E2	9	39
HPV18 E1	11	318	HPV18 E2	10	39
HPV18 E1	10	234	HPV18 E2	10	133
HPV18 E1	8	401	HPV18 E2	11	133
HPV18 E1	8	490	HPV18 E2	8	297
HPV18 E1	11	490	HPV18 E2	8	107
HPV18 E1	10	259	HPV18 E2	9	185
HPV18 E1	8	281	HPV18 E2	10	33
HPV18 E1	8	261	HPV18 E2	10	38
HPV18 E1	9	364	HPV18 E2	11	38
HPV18 E1	10	224	HPV18 E2	9	220
HPV18 E1	9	376	HPV18 E2	9	88
HPV18 E1	11	376	HPV18 E2	11	56
HPV18 E1	9	214	HPV18 E2	9	305
HPV18 E1	10	527	HPV18 E2	11	230
HPV18 E1	11	47	HPV18 E2	8	233
HPV18 E1	10	574	HPV18 E2	8	355
HPV18 E1	8	428	HPV18 E2	11	140
HPV18 E1	11	487	HPV18 E2	10	57
HPV18 E1	8	448	HPV18 E2	10	97
HPV18 E1	10	607	HPV18 E2	10	231
HPV18 E1	10	426	HPV18 E2	8	157
HPV18 E1	10	80	HPV18 E2	9	232
HPV18 E1	11	589	HPV18 E2	11	96
HPV18 E1	10	128	HPV18 E2	11	173
HPV18 E1	8	320	HPV18 E2	8	143
HPV18 E1	9	320	HPV18 E2	8	135
HPV18 E1	10	320	HPV18 E2	9	135
HPV18 E1	8	321	HPV18 E2	9	164
HPV18 E1	9	321	HPV18 E2	10	164
HPV18 E1	8	322	HPV18 E5	9	47
HPV18 E1	9	260	HPV18 E5	11	47
HPV18 E1	11	238	HPV18 E5	11	27
HPV18 E1	10	533	HPV18 E5	10	6
HPV18 E1	8	532	HPV18 E5	8	50
HPV18 E1	11	532	HPV18 E5	8	43

Table VII
HLA-A1 Supermotif Peptides

Peptide				Peptide		
HPV18	E5	11	43	HPV18	L1	9	383
HPV18	E5	11	40	HPV18	L1	9	175
HPV18	E5	10	22	HPV18	L1	10	175
HPV18	E5	9	2	HPV18	L1	8	38
HPV18	E5	8	1	HPV18	L1	10	13
HPV18	E5	10	1	HPV18	L1	11	454
HPV18	E5	11	21	HPV18	L1	9	428
HPV18	E5	8	24	HPV18	L1	11	428
HPV18	E5	10	24	HPV18	L1	10	40
HPV18	E5	8	3	HPV18	L1	11	39
HPV18	E5	9	25	HPV18	L1	11	46
HPV18	E5	10	44	HPV18	L1	10	47
HPV18	E5	9	42	HPV18	L1	10	9
HPV18	E5	10	41	HPV18	L1	10	443
HPV18	E6	8	27	HPV18	L1	9	360
HPV18	E6	10	77	HPV18	L1	10	125
HPV18	E6	8	40	HPV18	L1	11	8
HPV18	E6	10	40	HPV18	L1	9	14
HPV18	E6	11	43	HPV18	L1	8	103
HPV18	E6	8	120	HPV18	L1	9	103
HPV18	E6	11	117	HPV18	L1	8	445
HPV18	E6	8	92	HPV18	L1	8	104
HPV18	E6	10	36	HPV18	L1	11	298
HPV18	E6	9	41	HPV18	L1	11	261
HPV18	E6	8	74	HPV18	L1	10	36
HPV18	E6	11	24	HPV18	L1	8	457
HPV18	E6	11	89	HPV18	L1	10	457
HPV18	E6	9	37	HPV18	L1	8	510
HPV18	E6	11	37	HPV18	L1	8	52
HPV18	E6	8	38	HPV18	L1	9	57
HPV18	E6	10	38	HPV18	L1	11	282
HPV18	E6	10	72	HPV18	L1	11	173
HPV18	E7	9	82	HPV18	L1	8	28
HPV18	E7	10	77	HPV18	L1	10	26
HPV18	E7	11	90	HPV18	L1	9	472
HPV18	E7	9	92	HPV18	L1	11	472
HPV18	E7	9	88	HPV18	L1	11	412
HPV18	E7	9	78	HPV18	L1	8	315
HPV18	E7	8	93	HPV18	L1	8	366
HPV18	L1	11	63	HPV18	L1	8	137
HPV18	L1	8	345	HPV18	L1	9	287
HPV18	L1	11	407	HPV18	L1	8	410
HPV18	L1	8	310	HPV18	L1	9	102
HPV18	L1	11	2	HPV18	L1	10	102
HPV18	L1	9	284	HPV18	L1	10	135
HPV18	L1	8	122	HPV18	L1	8	81
HPV18	L1	10	122	HPV18	L1	8	288
HPV18	L1	11	520	HPV18	L1	8	459
HPV18	L1	9	364	HPV18	L1	10	359
HPV18	L1	10	364	HPV18	L1	8	475
HPV18	L1	9	263	HPV18	L1	10	455
HPV18	L1	8	330	HPV18	L1	9	458
HPV18	L1	10	203	HPV18	L1	11	100
HPV18	L1	8	49	HPV18	L1	10	408
HPV18	L1	11	49	HPV18	L1	11	78
HPV18	L1	8	517	HPV18	L1	11	442
HPV18	L1	8	145	HPV18	L1	9	444
HPV18	L1	8	177	HPV18	L1	11	327
HPV18	L1	11	342	HPV18	L1	11	362
HPV18	L1	11	358	HPV18	L1	9	474

Table VII
HLA-A1 Supermotif Peptides

HPV18	L1	8	473	HPV18	L2	11	364
HPV18	L1	10	473	HPV18	L2	8	220
HPV18	L1	9	126	HPV18	L2	10	450
HPV18	L1	8	89	HPV18	L2	10	247
HPV18	L1	8	361	HPV18	L2	11	246
HPV18	L1	9	295	HPV18	L2	8	393
HPV18	L1	11	35	HPV18	L2	11	147
HPV18	L1	8	425	HPV18	L2	10	153
HPV18	L1	9	4	HPV18	L2	8	365
HPV18	L1	8	88	HPV18	L2	10	365
HPV18	L1	9	88	HPV18	L2	9	149
HPV18	L2	11	286	HPV18	L2	8	377
HPV18	L2	8	341	HPV18	L2	9	39
HPV18	L2	11	341	HPV18	L2	9	406
HPV18	L2	11	322	HPV18	L2	8	367
HPV18	L2	11	404	HPV18	L2	9	114
HPV18	L2	11	443	HPV18	L2	9	288
HPV18	L2	11	241	HPV18	L2	9	392
HPV18	L2	11	296	HPV18	L2	10	148
HPV18	L2	8	429	HPV18	L2	10	38
HPV18	L2	10	429	HPV18	L2	9	154
HPV18	L2	10	62	HPV18	L2	9	366
HPV18	L2	8	64	HPV18	L2	8	388
HPV18	L2	10	432	HPV18	L2	11	217
HPV18	L2	11	432	HPV18	L2	10	339
HPV18	L2	10	183	HPV18	L2	8	150
HPV18	L2	10	310	HPV18	L2	11	417
HPV18	L2	11	310	HPV18	L2	8	234
HPV18	L2	11	37	HPV18	L2	10	113
HPV18	L2	10	44	HPV18	L2	9	387
HPV18	L2	10	323	HPV18	L2	11	112
HPV18	L2	11	152	HPV18	L2	9	427
HPV18	L2	10	405	HPV18	L2	10	427
HPV18	L2	8	249	HPV18	L2	8	436
HPV18	L2	11	43	HPV18	L2	11	374
HPV18	L2	9	248	HPV31	E1	10	186
HPV18	L2	10	242	HPV31	E1	8	504
HPV18	L2	10	287	HPV31	E1	9	81
HPV18	L2	10	391	HPV31	E1	9	213
HPV18	L2	11	338	HPV31	E1	8	96
HPV18	L2	10	386	HPV31	E1	8	421
HPV18	L2	8	325	HPV31	E1	8	336
HPV18	L2	11	390	HPV31	E1	10	336
HPV18	L2	10	362	HPV31	E1	9	364
HPV18	L2	11	362	HPV31	E1	8	352
HPV18	L2	9	419	HPV31	E1	9	42
HPV18	L2	9	120	HPV31	E1	10	348
HPV18	L2	9	376	HPV31	E1	9	311
HPV18	L2	8	185	HPV31	E1	10	583
HPV18	L2	8	258	HPV31	E1	11	583
HPV18	L2	10	360	HPV31	E1	8	50
HPV18	L2	8	312	HPV31	E1	9	473
HPV18	L2	9	312	HPV31	E1	9	425
HPV18	L2	10	172	HPV31	E1	8	436
HPV18	L2	9	233	HPV31	E1	8	199
HPV18	L2	9	298	HPV31	E1	9	566
HPV18	L2	9	268	HPV31	E1	11	433
HPV18	L2	8	364	HPV31	E1	11	499
HPV18	L2	9	364	HPV31	E1	9	305
				HPV31	E1	10	252

Table VII
HLA-A1 Supermotif Peptides

HPV31	E1	8	11	HPV31	E2	9	307
HPV31	E1	9	11	HPV31	E2	11	22
HPV31	E1	11	196	HPV31	E2	8	124
HPV31	E1	10	222	HPV31	E2	11	124
HPV31	E1	9	243	HPV31	E2	11	197
HPV31	E1	8	328	HPV31	E2	8	80
HPV31	E1	9	560	HPV31	E2	11	185
HPV31	E1	11	478	HPV31	E2	8	200
HPV31	E1	11	309	HPV31	E2	8	171
HPV31	E1	11	471	HPV31	E2	11	168
HPV31	E1	10	479	HPV31	E2	10	35
HPV31	E1	11	479	HPV31	E2	8	164
HPV31	E1	10	291	HPV31	E2	9	345
HPV31	E1	11	291	HPV31	E2	8	193
HPV31	E1	8	590	HPV31	E2	8	312
HPV31	E1	11	463	HPV31	E2	10	78
HPV31	E1	8	119	HPV31	E2	11	77
HPV31	E1	10	232	HPV31	E2	8	303
HPV31	E1	8	412	HPV31	E2	9	84
HPV31	E1	8	234	HPV31	E2	8	127
HPV31	E1	10	94	HPV31	E2	10	127
HPV31	E1	9	584	HPV31	E2	9	361
HPV31	E1	10	584	HPV31	E2	11	9
HPV31	E1	9	337	HPV31	E2	10	106
HPV31	E1	10	563	HPV31	E2	10	317
HPV31	E1	10	500	HPV31	E2	10	191
HPV31	E1	9	187	HPV31	E2	8	151
HPV31	E1	8	306	HPV31	E2	9	151
HPV31	E1	11	47	HPV31	E2	8	321
HPV31	E1	9	253	HPV31	E2	8	25
HPV31	E1	10	547	HPV31	E2	9	25
HPV31	E1	10	117	HPV31	E2	8	37
HPV31	E1	11	93	HPV31	E2	9	311
HPV31	E1	10	580	HPV31	E2	8	346
HPV31	E1	10	207	HPV31	E2	10	198
HPV31	E1	8	323	HPV31	E2	9	128
HPV31	E1	10	124	HPV31	E2	11	128
HPV31	E1	11	562	HPV31	E2	10	93
HPV31	E1	8	293	HPV31	E2	8	362
HPV31	E1	9	293	HPV31	E2	9	192
HPV31	E1	10	293	HPV31	E2	11	92
HPV31	E1	11	303	HPV31	E2	10	344
HPV31	E1	11	40	HPV31	E2	8	131
HPV31	E1	8	294	HPV31	E2	9	159
HPV31	E1	9	294	HPV31	E2	10	159
HPV31	E1	11	211	HPV31	E5	11	40
HPV31	E1	9	233	HPV31	E5	8	53
HPV31	E1	11	333	HPV31	E5	11	53
HPV31	E1	11	505	HPV31	E5	8	61
HPV31	E1	11	325	HPV31	E5	10	15
HPV31	E1	9	349	HPV31	E5	9	72
HPV31	E1	11	349	HPV31	E5	10	6
HPV31	E1	8	254	HPV31	E5	9	11
HPV31	E1	10	434	HPV31	E5	9	16
HPV31	E1	10	197	HPV31	E5	8	43
HPV31	E1	9	223	HPV31	E5	9	42
HPV31	E1	9	564	HPV31	E5	8	32
HPV31	E1	11	564	HPV31	E5	11	5
HPV31	E1	9	558	HPV31	E5	11	70
HPV31	E1	11	558	HPV31	E5	8	56

Table VII
HLA-A1 Supermotif Peptides

HPV31 E5	11	56	HPV31 L1	11	381
HPV31 E5	9	31	HPV31 L1	8	357
HPV31 E5	10	10	HPV31 L1	10	65
HPV31 E5	9	7	HPV31 L1	8	20
HPV31 E5	10	41	HPV31 L1	8	42
HPV31 E5	10	54	HPV31 L1	9	42
HPV31 E5	8	8	HPV31 L1	8	384
HPV31 E5	10	51	HPV31 L1	8	43
HPV31 E5	8	73	HPV31 L1	11	238
HPV31 E5	8	12	HPV31 L1	11	201
HPV31 E5	11	9	HPV31 L1	9	300
HPV31 E5	9	64	HPV31 L1	11	351
HPV31 E5	11	50	HPV31 L1	9	227
HPV31 E5	10	63	HPV31 L1	11	222
HPV31 E6	11	66	HPV31 L1	9	411
HPV31 E6	8	63	HPV31 L1	11	411
HPV31 E6	8	25	HPV31 L1	11	17
HPV31 E6	10	14	HPV31 L1	8	306
HPV31 E6	9	39	HPV31 L1	8	255
HPV31 E6	8	47	HPV31 L1	9	41
HPV31 E6	9	61	HPV31 L1	10	41
HPV31 E6	10	61	HPV31 L1	8	77
HPV31 E6	8	118	HPV31 L1	10	77
HPV31 E6	8	72	HPV31 L1	10	75
HPV31 E6	10	72	HPV31 L1	8	228
HPV31 E6	9	15	HPV31 L1	8	414
HPV31 E6	9	37	HPV31 L1	11	2
HPV31 E6	11	37	HPV31 L1	10	394
HPV31 E6	10	36	HPV31 L1	10	299
HPV31 E6	8	16	HPV31 L1	10	283
HPV31 E6	9	73	HPV31 L1	11	283
HPV31 E6	9	132	HPV31 L1	8	286
HPV31 E6	9	70	HPV31 L1	9	383
HPV31 E6	10	70	HPV31 L1	9	302
HPV31 E7	10	48	HPV31 L1	8	354
HPV31 E7	8	4	HPV31 L1	11	354
HPV31 E7	10	78	HPV31 L1	11	267
HPV31 E7	11	77	HPV31 L1	9	66
HPV31 E7	9	49	HPV31 L1	10	18
HPV31 L1	9	348	HPV31 L1	8	28
HPV31 L1	8	398	HPV31 L1	8	301
HPV31 L1	8	285	HPV31 L1	10	62
HPV31 L1	9	285	HPV31 L1	9	235
HPV31 L1	9	224	HPV31 L1	8	364
HPV31 L1	11	459	HPV31 L1	8	250
HPV31 L1	8	129	HPV31 L1	8	27
HPV31 L1	9	203	HPV31 L1	9	27
HPV31 L1	9	353	HPV31 L2	11	286
HPV31 L1	8	270	HPV31 L2	9	311
HPV31 L1	8	449	HPV31 L2	10	311
HPV31 L1	8	456	HPV31 L2	11	311
HPV31 L1	9	323	HPV31 L2	11	376
HPV31 L1	11	117	HPV31 L2	8	354
HPV31 L1	9	413	HPV31 L2	10	253
HPV31 L1	11	298	HPV31 L2	11	253
HPV31 L1	11	282	HPV31 L2	11	237
HPV31 L1	11	393	HPV31 L2	8	433
HPV31 L1	10	118	HPV31 L2	11	351
HPV31 L1	10	382	HPV31 L2	10	63
HPV31 L1	11	61	HPV31 L2	8	65

Table VII
HLA-A1 Supermotif Peptides

HPV31	L2	11	213		HPV33	E1	8	349
HPV31	L2	11	38		HPV33	E1	10	349
HPV31	L2	10	45		HPV33	E1	8	365
HPV31	L2	11	45		HPV33	E1	9	42
HPV31	L2	8	245		HPV33	E1	9	377
HPV31	L2	9	244		HPV33	E1	9	62
HPV31	L2	10	238		HPV33	E1	9	324
HPV31	L2	11	178		HPV33	E1	9	516
HPV31	L2	10	395		HPV33	E1	10	361
HPV31	L2	10	287		HPV33	E1	11	361
HPV31	L2	11	447		HPV33	E1	8	449
HPV31	L2	8	269		HPV33	E1	8	212
HPV31	L2	10	390		HPV33	E1	8	446
HPV31	L2	10	410		HPV33	E1	11	446
HPV31	L2	11	122		HPV33	E1	10	265
HPV31	L2	11	394		HPV33	E1	11	209
HPV31	L2	9	425		HPV33	E1	8	11
HPV31	L2	11	44		HPV33	E1	11	512
HPV31	L2	10	243		HPV33	E1	8	564
HPV31	L2	9	378		HPV33	E1	8	341
HPV31	L2	9	229		HPV33	E1	9	573
HPV31	L2	11	429		HPV33	E1	11	192
HPV31	L2	11	9		HPV33	E1	9	266
HPV31	L2	9	431		HPV33	E1	8	267
HPV31	L2	10	431		HPV33	E1	9	200
HPV31	L2	8	181		HPV33	E1	10	492
HPV31	L2	9	180		HPV33	E1	11	492
HPV31	L2	10	179		HPV33	E1	11	322
HPV31	L2	9	396		HPV33	E1	10	210
HPV31	L2	8	151		HPV33	E1	9	520
HPV31	L2	8	346		HPV33	E1	10	124
HPV31	L2	11	346		HPV33	E1	10	304
HPV31	L2	8	379		HPV33	E1	11	304
HPV31	L2	10	149		HPV33	E1	10	220
HPV31	L2	9	40		HPV33	E1	8	603
HPV31	L2	8	312		HPV33	E1	11	476
HPV31	L2	9	312		HPV33	E1	8	425
HPV31	L2	10	312		HPV33	E1	10	245
HPV31	L2	10	347		HPV33	E1	8	247
HPV31	L2	11	266		HPV33	E1	9	438
HPV31	L2	9	288		HPV33	E1	9	350
HPV31	L2	9	345		HPV33	E1	9	362
HPV31	L2	11	148		HPV33	E1	10	362
HPV31	L2	10	39		HPV33	E1	11	362
HPV31	L2	8	426		HPV33	E1	10	576
HPV31	L2	10	344		HPV33	E1	8	336
HPV31	L2	11	343		HPV33	E1	10	513
HPV31	L2	9	391		HPV33	E1	11	443
HPV31	L2	9	254		HPV33	E1	11	346
HPV31	L2	10	254		HPV33	E1	10	199
HPV31	L2	8	392		HPV33	E1	8	195
HPV31	L2	10	430		HPV33	E1	10	195
HPV31	L2	11	430		HPV33	E1	10	560
HPV31	L2	9	150		HPV33	E1	10	519
HPV33	E1	10	596		HPV33	E1	8	434
HPV33	E1	11	596		HPV33	E1	10	593
HPV33	E1	9	81		HPV33	E1	10	437
HPV33	E1	9	226		HPV33	E1	8	308
HPV33	E1	8	494		HPV33	E1	11	575
HPV33	E1	9	494		HPV33	E1	9	335

Table VII
HLA-A1 Supermotif Peptides

HPV33	E1	8	306		HPV33	E2	8	131
HPV33	E1	9	306		HPV33	E5	11	56
HPV33	E1	10	306		HPV33	E5	10	3
HPV33	E1	10	111		HPV33	E5	9	42
HPV33	E1	10	193		HPV33	E5	10	42
HPV33	E1	11	224		HPV33	E5	8	5
HPV33	E1	11	110		HPV33	E5	8	44
HPV33	E1	9	577		HPV33	E5	10	44
HPV33	E1	11	577		HPV33	E5	9	23
HPV33	E1	11	491		HPV33	E5	9	48
HPV33	E1	9	246		HPV33	E5	11	48
HPV33	E1	11	338		HPV33	E5	8	22
HPV33	E1	8	517		HPV33	E5	10	22
HPV33	E1	9	571		HPV33	E5	9	32
HPV33	E1	11	571		HPV33	E5	11	32
HPV33	E2	10	78		HPV33	E5	8	24
HPV33	E2	11	41		HPV33	E5	8	35
HPV33	E2	10	10		HPV33	E5	8	33
HPV33	E2	9	288		HPV33	E5	10	33
HPV33	E2	10	145		HPV33	E5	9	1
HPV33	E2	9	25		HPV33	E5	9	21
HPV33	E2	10	235		HPV33	E5	11	21
HPV33	E2	10	298		HPV33	E5	8	46
HPV33	E2	10	282		HPV33	E5	11	46
HPV33	E2	8	80		HPV33	E5	9	34
HPV33	E2	11	100		HPV33	E5	10	31
HPV33	E2	10	325		HPV33	E5	11	40
HPV33	E2	11	34		HPV33	E5	9	58
HPV33	E2	9	84		HPV33	E6	11	66
HPV33	E2	11	23		HPV33	E6	8	69
HPV33	E2	8	151		HPV33	E6	11	69
HPV33	E2	9	151		HPV33	E6	9	61
HPV33	E2	10	35		HPV33	E6	8	118
HPV33	E2	9	62		HPV33	E6	9	73
HPV33	E2	10	42		HPV33	E6	8	72
HPV33	E2	11	82		HPV33	E6	10	72
HPV33	E2	8	147		HPV33	E6	10	70
HPV33	E2	11	315		HPV33	E6	11	50
HPV33	E2	8	284		HPV33	E6	8	36
HPV33	E2	8	127		HPV33	E6	10	36
HPV33	E2	11	60		HPV33	E6	9	39
HPV33	E2	9	342		HPV33	E6	10	51
HPV33	E2	9	292		HPV33	E6	9	52
HPV33	E2	8	37		HPV33	E7	10	14
HPV33	E2	10	61		HPV33	E7	11	6
HPV33	E2	8	302		HPV33	E7	10	7
HPV33	E2	9	301		HPV33	L1	10	392
HPV33	E2	10	93		HPV33	L1	8	284
HPV33	E2	11	128		HPV33	L1	9	284
HPV33	E2	9	146		HPV33	L1	9	411
HPV33	E2	8	343		HPV33	L1	10	345
HPV33	E2	9	326		HPV33	L1	9	223
HPV33	E2	11	148		HPV33	L1	8	396
HPV33	E2	9	102		HPV33	L1	11	457
HPV33	E2	11	92		HPV33	L1	9	351
HPV33	E2	9	159		HPV33	L1	8	129
HPV33	E2	10	159		HPV33	L1	9	202
HPV33	E2	8	300		HPV33	L1	9	303
HPV33	E2	10	300		HPV33	L1	10	303
HPV33	E2	8	44		HPV33	L1	8	447

Table VII
HLA-A1 Supermotif Peptides

HPV33	L1	8	249	HPV33	L2	10	27
HPV33	L1	8	454	HPV33	L2	11	291
HPV33	L1	9	322	HPV33	L2	10	272
HPV33	L1	11	117	HPV33	L2	10	431
HPV33	L1	11	297	HPV33	L2	11	258
HPV33	L1	9	226	HPV33	L2	10	447
HPV33	L1	11	281	HPV33	L2	11	242
HPV33	L1	9	365	HPV33	L2	11	183
HPV33	L1	11	365	HPV33	L2	8	440
HPV33	L1	10	118	HPV33	L2	8	421
HPV33	L1	10	65	HPV33	L2	10	421
HPV33	L1	11	379	HPV33	L2	8	64
HPV33	L1	8	20	HPV33	L2	10	62
HPV33	L1	8	42	HPV33	L2	11	218
HPV33	L1	9	42	HPV33	L2	11	37
HPV33	L1	11	61	HPV33	L2	8	374
HPV33	L1	8	382	HPV33	L2	11	374
HPV33	L1	10	62	HPV33	L2	8	336
HPV33	L1	11	237	HPV33	L2	10	44
HPV33	L1	11	200	HPV33	L2	11	44
HPV33	L1	9	299	HPV33	L2	9	448
HPV33	L1	11	221	HPV33	L2	11	448
HPV33	L1	8	439	HPV33	L2	9	273
HPV33	L1	9	409	HPV33	L2	9	155
HPV33	L1	11	409	HPV33	L2	10	292
HPV33	L1	11	17	HPV33	L2	8	250
HPV33	L1	8	305	HPV33	L2	11	250
HPV33	L1	8	254	HPV33	L2	10	104
HPV33	L1	8	347	HPV33	L2	8	433
HPV33	L1	9	41	HPV33	L2	10	248
HPV33	L1	10	41	HPV33	L2	9	249
HPV33	L1	8	77	HPV33	L2	10	243
HPV33	L1	10	77	HPV33	L2	11	405
HPV33	L1	10	75	HPV33	L2	10	372
HPV33	L1	8	285	HPV33	L2	10	391
HPV33	L1	8	412	HPV33	L2	8	423
HPV33	L1	10	298	HPV33	L2	11	333
HPV33	L1	11	39	HPV33	L2	9	413
HPV33	L1	8	227	HPV33	L2	10	347
HPV33	L1	8	352	HPV33	L2	9	376
HPV33	L1	11	352	HPV33	L2	9	121
HPV33	L1	11	2	HPV33	L2	11	411
HPV33	L1	11	266	HPV33	L2	8	186
HPV33	L1	9	381	HPV33	L2	8	221
HPV33	L1	11	349	HPV33	L2	8	317
HPV33	L1	10	238	HPV33	L2	9	317
HPV33	L1	11	238	HPV33	L2	11	43
HPV33	L1	11	301	HPV33	L2	11	191
HPV33	L1	10	282	HPV33	L2	11	153
HPV33	L1	11	282	HPV33	L2	9	234
HPV33	L1	9	66	HPV33	L2	10	357
HPV33	L1	10	18	HPV33	L2	8	393
HPV33	L1	8	28	HPV33	L2	8	122
HPV33	L1	9	28	HPV33	L2	11	103
HPV33	L1	10	380	HPV33	L2	8	106
HPV33	L1	8	300	HPV33	L2	10	418
HPV33	L1	8	362	HPV33	L2	11	418
HPV33	L1	9	234	HPV33	L2	10	184
HPV33	L1	8	27	HPV33	L2	10	354
HPV33	L1	9	27	HPV33	L2	8	156

Table VII
HLA-A1 Supermotif Peptides

HPV33	L2	10	38	HPV45	E1	11	476
HPV33	L2	9	39	HPV45	E1	10	245
HPV33	L2	10	154	HPV45	E1	8	247
HPV33	L2	9	432	HPV45	E1	8	267
HPV33	L2	9	244	HPV45	E1	9	350
HPV33	L2	9	293	HPV45	E1	10	210
HPV33	L2	11	417	HPV45	E1	9	362
HPV33	L2	11	353	HPV45	E1	11	362
HPV33	L2	9	392	HPV45	E1	9	200
HPV33	L2	9	105	HPV45	E1	10	513
HPV33	L2	8	356	HPV45	E1	10	560
HPV33	L2	11	356	HPV45	E1	8	414
HPV45	E1	10	199	HPV45	E1	11	473
HPV45	E1	11	512	HPV45	E1	8	434
HPV45	E1	11	40	HPV45	E1	10	593
HPV45	E1	8	517	HPV45	E1	10	412
HPV45	E1	9	517	HPV45	E1	10	80
HPV45	E1	11	202	HPV45	E1	10	128
HPV45	E1	10	423	HPV45	E1	8	306
HPV45	E1	9	226	HPV45	E1	9	306
HPV45	E1	8	349	HPV45	E1	10	306
HPV45	E1	10	349	HPV45	E1	11	575
HPV45	E1	10	361	HPV45	E1	8	307
HPV45	E1	10	623	HPV45	E1	9	307
HPV45	E1	9	42	HPV45	E1	8	308
HPV45	E1	10	596	HPV45	E1	9	246
HPV45	E1	11	596	HPV45	E1	11	224
HPV45	E1	8	365	HPV45	E1	9	577
HPV45	E1	9	573	HPV45	E1	11	577
HPV45	E1	9	324	HPV45	E1	9	81
HPV45	E1	11	446	HPV45	E1	9	266
HPV45	E1	10	385	HPV45	E1	8	325
HPV45	E1	9	486	HPV45	E1	10	576
HPV45	E1	8	449	HPV45	E1	9	571
HPV45	E1	9	438	HPV45	E1	11	571
HPV45	E1	8	212	HPV45	E2	10	84
HPV45	E1	9	579	HPV45	E2	10	16
HPV45	E1	8	130	HPV45	E2	9	305
HPV45	E1	8	494	HPV45	E2	11	134
HPV45	E1	9	494	HPV45	E2	8	158
HPV45	E1	11	209	HPV45	E2	9	158
HPV45	E1	8	11	HPV45	E2	8	31
HPV45	E1	9	11	HPV45	E2	9	31
HPV45	E1	11	459	HPV45	E2	11	28
HPV45	E1	10	265	HPV45	E2	8	171
HPV45	E1	10	235	HPV45	E2	8	319
HPV45	E1	9	256	HPV45	E2	11	106
HPV45	E1	10	519	HPV45	E2	8	154
HPV45	E1	11	338	HPV45	E2	9	154
HPV45	E1	11	491	HPV45	E2	10	41
HPV45	E1	11	322	HPV45	E2	9	341
HPV45	E1	10	447	HPV45	E2	8	301
HPV45	E1	10	492	HPV45	E2	9	187
HPV45	E1	11	492	HPV45	E2	9	357
HPV45	E1	8	425	HPV45	E2	8	109
HPV45	E1	10	304	HPV45	E2	9	332
HPV45	E1	11	304	HPV45	E2	11	40
HPV45	E1	10	220	HPV45	E2	9	90
HPV45	E1	8	387	HPV45	E2	8	43
HPV45	E1	8	476	HPV45	E2	9	309

Table VII
HLA-A1 Supermotif Peptides

HPV45	E2	11	142	HPV45	L1	8	111
HPV45	E2	8	358	HPV45	L1	8	143
HPV45	E2	10	99	HPV45	L1	11	326
HPV45	E2	8	159	HPV45	L1	11	422
HPV45	E2	8	138	HPV45	L1	9	396
HPV45	E2	11	98	HPV45	L1	11	396
HPV45	E2	9	166	HPV45	L1	10	12
HPV45	E2	10	166	HPV45	L1	11	11
HPV45	E2	8	145	HPV45	L1	10	5
HPV45	E2	8	317	HPV45	L1	10	411
HPV45	E2	10	317	HPV45	L1	9	328
HPV45	E2	11	175	HPV45	L1	10	91
HPV45	E2	8	137	HPV45	L1	8	68
HPV45	E2	9	137	HPV45	L1	9	68
HPV45	E6	9	37	HPV45	L1	8	413
HPV45	E6	11	37	HPV45	L1	8	69
HPV45	E6	8	27	HPV45	L1	11	264
HPV45	E6	10	77	HPV45	L1	11	227
HPV45	E6	11	43	HPV45	L1	11	4
HPV45	E6	10	53	HPV45	L1	11	310
HPV45	E6	8	120	HPV45	L1	8	425
HPV45	E6	9	54	HPV45	L1	10	425
HPV45	E6	8	92	HPV45	L1	8	383
HPV45	E6	8	74	HPV45	L1	11	383
HPV45	E6	9	41	HPV45	L1	8	17
HPV45	E6	11	24	HPV45	L1	9	22
HPV45	E6	11	89	HPV45	L1	11	248
HPV45	E6	8	38	HPV45	L1	11	139
HPV45	E6	10	38	HPV45	L1	9	440
HPV45	E6	9	72	HPV45	L1	11	440
HPV45	E6	10	72	HPV45	L1	11	380
HPV45	E7	9	83	HPV45	L1	8	281
HPV45	E7	10	20	HPV45	L1	8	334
HPV45	E7	11	91	HPV45	L1	9	253
HPV45	E7	10	92	HPV45	L1	9	67
HPV45	E7	9	89	HPV45	L1	10	67
HPV45	E7	9	93	HPV45	L1	10	101
HPV45	E7	8	94	HPV45	L1	8	46
HPV45	L1	8	103	HPV45	L1	8	254
HPV45	L1	11	28	HPV45	L1	8	427
HPV45	L1	11	375	HPV45	L1	10	327
HPV45	L1	8	88	HPV45	L1	8	443
HPV45	L1	10	88	HPV45	L1	10	423
HPV45	L1	8	276	HPV45	L1	9	426
HPV45	L1	9	188	HPV45	L1	11	65
HPV45	L1	9	250	HPV45	L1	10	376
HPV45	L1	11	488	HPV45	L1	11	43
HPV45	L1	9	332	HPV45	L1	11	410
HPV45	L1	10	332	HPV45	L1	9	412
HPV45	L1	9	229	HPV45	L1	11	330
HPV45	L1	11	461	HPV45	L1	9	442
HPV45	L1	8	296	HPV45	L1	10	462
HPV45	L1	10	169	HPV45	L1	8	329
HPV45	L1	8	313	HPV45	L1	8	441
HPV45	L1	8	14	HPV45	L1	10	441
HPV45	L1	11	14	HPV45	L1	8	478
HPV45	L1	8	485	HPV45	L1	11	293
HPV45	L1	9	351	HPV45	L1	9	92
HPV45	L1	9	141	HPV45	L1	8	54
HPV45	L1	10	141	HPV45	L1	9	477

Table VII
HLA-A1 Supermotif Peptides

HPV45	L1	9	261	HPV45	L2	9	154
HPV45	L1	8	393	HPV45	L2	11	358
HPV45	L1	8	53	HPV45	L2	9	149
HPV45	L1	9	53	HPV45	L2	8	363
HPV45	L2	11	286	HPV45	L2	11	363
HPV45	L2	9	114	HPV45	L2	9	39
HPV45	L2	8	340	HPV45	L2	10	376
HPV45	L2	11	340	HPV45	L2	9	393
HPV45	L2	11	405	HPV45	L2	8	155
HPV45	L2	9	345	HPV45	L2	9	268
HPV45	L2	8	343	HPV45	L2	11	418
HPV45	L2	11	343	HPV45	L2	10	38
HPV45	L2	10	148	HPV45	L2	10	359
HPV45	L2	11	241	HPV45	L2	11	426
HPV45	L2	11	296	HPV45	L2	8	389
HPV45	L2	8	430	HPV45	L2	11	217
HPV45	L2	10	430	HPV45	L2	8	150
HPV45	L2	8	64	HPV45	L2	8	249
HPV45	L2	10	62	HPV45	L2	9	388
HPV45	L2	10	183	HPV45	L2	11	112
HPV45	L2	9	433	HPV45	L2	9	428
HPV45	L2	10	433	HPV45	L2	10	428
HPV45	L2	11	433	HPV45	L2	8	437
HPV45	L2	11	37	HPV45	L2	9	437
HPV45	L2	10	406	HPV56	E2	10	21
HPV45	L2	9	407	HPV56	E2	9	71
HPV45	L2	10	44	HPV56	E2	11	71
HPV45	L2	10	338	HPV56	E2	10	92
HPV45	L2	11	152	HPV56	E2	11	92
HPV45	L2	11	43	HPV56	E2	9	140
HPV45	L2	8	366	HPV56	E2	8	263
HPV45	L2	11	337	HPV56	E2	11	43
HPV45	L2	10	287	HPV56	E2	8	23
HPV45	L2	10	242	HPV56	E2	10	128
HPV45	L2	11	375	HPV56	E2	11	294
HPV45	L2	10	392	HPV56	E2	8	261
HPV45	L2	9	248	HPV56	E2	10	261
HPV45	L2	10	387	HPV56	E2	9	66
HPV45	L2	8	258	HPV56	E2	8	94
HPV45	L2	11	391	HPV56	E2	9	94
HPV45	L2	8	378	HPV56	E2	8	130
HPV45	L2	8	361	HPV56	E2	8	297
HPV45	L2	10	361	HPV56	E2	10	299
HPV45	L2	9	120	HPV56	E2	11	258
HPV45	L2	9	420	HPV56	E2	8	90
HPV45	L2	8	185	HPV56	E2	10	295
HPV45	L2	10	267	HPV56	E2	11	25
HPV45	L2	11	118	HPV56	E2	8	46
HPV45	L2	8	312	HPV56	E2	11	149
HPV45	L2	9	312	HPV56	E2	8	152
HPV45	L2	10	172	HPV56	E2	8	301
HPV45	L2	9	233	HPV56	E2	9	246
HPV45	L2	10	451	HPV56	E2	10	26
HPV45	L2	9	298	HPV56	E2	8	141
HPV45	L2	8	220	HPV56	E2	8	28
HPV45	L2	10	247	HPV56	E2	10	259
HPV45	L2	11	246	HPV56	E2	10	36
HPV45	L2	9	288	HPV56	E2	8	271
HPV45	L2	10	153	HPV56	E2	9	27
HPV45	L2	9	362	HPV56	E2	10	150

Table VII
HLA-A1 Supermotif Peptides

HPV56	E2	9	45		HPV56	L1	8	334
HPV56	E2	11	35		HPV56	L1	8	258
HPV56	E2	9	270		HPV56	L1	11	258
HPV56	E2	10	79		HPV56	L1	11	413
HPV56	E2	8	278		HPV56	L1	10	93
HPV56	E2	11	111		HPV56	L1	11	300
HPV56	E2	8	74		HPV56	L1	10	98
HPV56	E2	9	74		HPV56	L1	8	55
HPV56	E2	9	102		HPV56	L1	8	77
HPV56	E2	10	102		HPV56	L1	9	77
HPV56	E6	9	64		HPV56	L1	8	416
HPV56	E6	10	64		HPV56	L1	11	234
HPV56	E6	11	69		HPV56	L1	9	333
HPV56	E6	8	50		HPV56	L1	8	2
HPV56	E6	8	28		HPV56	L1	9	1
HPV56	E6	10	52		HPV56	L1	11	271
HPV56	E6	8	39		HPV56	L1	8	95
HPV56	E6	10	39		HPV56	L1	10	95
HPV56	E6	8	54		HPV56	L1	10	426
HPV56	E6	10	54		HPV56	L1	9	31
HPV56	E6	8	75		HPV56	L1	8	473
HPV56	E6	10	75		HPV56	L1	11	255
HPV56	E6	10	26		HPV56	L1	9	13
HPV56	E6	10	70		HPV56	L1	11	467
HPV56	E6	9	40		HPV56	L1	10	442
HPV56	E6	9	55		HPV56	L1	11	52
HPV56	E6	11	25		HPV56	L1	8	288
HPV56	E6	10	98		HPV56	L1	8	339
HPV56	E6	10	119		HPV56	L1	9	260
HPV56	E6	9	135		HPV56	L1	9	76
HPV56	E6	9	73		HPV56	L1	10	76
HPV56	E6	10	73		HPV56	L1	8	110
HPV56	E7	9	62		HPV56	L1	10	108
HPV56	E7	11	60		HPV56	L1	8	446
HPV56	L1	8	381		HPV56	L1	10	332
HPV56	L1	8	444		HPV56	L1	11	74
HPV56	L1	10	444		HPV56	L1	10	379
HPV56	L1	11	37		HPV56	L1	8	261
HPV56	L1	8	26		HPV56	L1	9	415
HPV56	L1	9	195		HPV56	L1	11	335
HPV56	L1	9	257		HPV56	L1	9	445
HPV56	L1	11	491		HPV56	L1	9	99
HPV56	L1	10	486		HPV56	L1	10	53
HPV56	L1	10	60		HPV56	L1	10	7
HPV56	L1	11	60		HPV56	L1	9	268
HPV56	L1	9	236		HPV56	L1	8	396
HPV56	L1	8	23		HPV56	L1	8	283
HPV56	L1	11	23		HPV56	L1	8	62
HPV56	L1	8	481		HPV56	L1	9	62
HPV56	L1	8	303		HPV56	L2	8	438
HPV56	L1	10	21		HPV56	L2	11	246
HPV56	L1	8	488		HPV56	L2	11	406
HPV56	L1	9	356		HPV56	L2	11	30
HPV56	L1	8	118		HPV56	L2	9	429
HPV56	L1	8	150		HPV56	L2	9	114
HPV56	L1	11	331		HPV56	L2	10	287
HPV56	L1	9	399		HPV56	L2	11	118
HPV56	L1	11	399		HPV56	L2	8	64
HPV56	L1	11	378		HPV56	L2	10	434
HPV56	L1	10	414		HPV56	L2	11	434

Table VII
HLA-A1 Supermotif Peptides

HPV56	L2	8	258	SF 1160080 v1
HPV56	L2	10	62	
HPV56	L2	10	310	
HPV56	L2	11	310	
HPV56	L2	8	269	
HPV56	L2	11	372	
HPV56	L2	11	190	
HPV56	L2	8	44	
HPV56	L2	10	44	
HPV56	L2	11	44	
HPV56	L2	9	210	
HPV56	L2	11	182	
HPV56	L2	9	279	
HPV56	L2	10	407	
HPV56	L2	9	43	
HPV56	L2	11	43	
HPV56	L2	10	38	
HPV56	L2	8	337	
HPV56	L2	11	338	
HPV56	L2	9	248	
HPV56	L2	10	278	
HPV56	L2	10	342	
HPV56	L2	10	388	
HPV56	L2	8	395	
HPV56	L2	9	374	
HPV56	L2	10	209	
HPV56	L2	10	392	
HPV56	L2	11	392	
HPV56	L2	9	336	
HPV56	L2	10	267	
HPV56	L2	9	410	
HPV56	L2	8	185	
HPV56	L2	8	312	
HPV56	L2	9	312	
HPV56	L2	10	312	
HPV56	L2	11	421	
HPV56	L2	9	233	
HPV56	L2	8	220	
HPV56	L2	9	435	
HPV56	L2	10	435	
HPV56	L2	11	435	
HPV56	L2	10	153	
HPV56	L2	8	211	
HPV56	L2	9	154	
HPV56	L2	10	183	
HPV56	L2	11	414	
HPV56	L2	10	247	
HPV56	L2	9	288	
HPV56	L2	11	112	
HPV56	L2	9	408	
HPV56	L2	11	408	
HPV56	L2	8	249	
HPV56	L2	11	152	
HPV56	L2	9	389	
HPV56	L2	10	31	
HPV56	L2	10	431	

Table VIIA HPV6A
HLA-A1 Supermotif Peptides

2	3	4			
L2	11	286	L1	8	450
E4	8	14	E1	9	587
E1	11	520	E2	8	171
E1	10	207	E5	9	28
L1	8	81	L1	9	318
L2	8	421	E1	10	243
E6	8	37	E2	9	156
E6	10	37	E1	11	217
L2	9	288	E1	10	273
E1	11	330	E1	8	11
L1	9	342	L2	10	431
E1	8	525	L2	11	431
E6	11	10	L2	10	62
E1	10	77	E1	10	431
E1	10	601	L1	11	293
E6	11	67	E2	10	179
E2	10	35	L2	11	215
E6	11	131	L2	8	64
E4	9	64	E1	11	436
E1	10	369	L1	9	407
L1	9	219	L1	9	222
E6	10	96	E1	8	316
E1	8	570	L1	9	111
E1	10	570	L1	11	113
E2	9	313	L2	8	312
E1	11	81	L2	9	312
E2	9	25	L2	10	312
E1	10	203	E6	8	119
E1	9	42	E1	9	264
L2	11	266	E4	8	59
E7	9	44	E2	10	78
L2	10	344	E2	10	310
L1	9	198	E4	10	10
E2	10	136	E2	9	338
L2	10	120	E2	10	149
L1	11	453	E2	11	149
E1	10	604	E6	9	25
E1	11	604	L1	11	387
E1	9	131	E1	9	581
E1	10	417	L1	9	361
E2	11	100	L1	11	361
E1	8	373	E1	8	502
E2	8	80	E1	9	502
E2	8	293	E5	8	21
E2	10	293	E5	10	31
L1	8	443	E6	9	97
E2	10	205	E5	9	32
E1	8	220	L2	10	44
E6	8	126	L2	11	44
E1	8	454	E5	8	17
E1	11	454	E1	10	500
L2	8	428	E1	11	500
E5	9	68	E1	9	571
E1	10	393	L1	10	376
L2	10	398	L2	8	247
E1	9	446	E1	11	476
L1	8	245	L2	9	121
E1	8	457	E5	10	34
L2	11	239	E1	8	433
			E6	8	73

Table VIIA HPV6A
HLA-A1 Supermotif Peptides

E6	10	73		E2	10	281
E1	10	312		L2	10	38
E1	11	312		E2	8	127
E1	9	254		L1	11	217
E1	8	357		L2	10	189
E1	10	357		L1	11	109
E1	10	228		E1	10	258
E1	11	484		L2	10	389
E2	9	84		L2	10	337
L1	10	56		L1	9	391
E6	11	116		L2	9	408
E6	8	52		E2	9	354
E6	10	52		L1	11	426
L1	10	61		L1	8	90
L1	8	19		L2	9	426
L1	10	71		L2	10	426
E1	8	255		E5	10	19
E5	9	16		L1	11	16
E2	8	314		L2	11	418
L2	9	246		L2	9	363
E5	8	33		L2	11	43
E5	11	33		L1	8	301
L1	8	41		E6	10	50
L1	9	41		E4	9	4
E1	10	521		L1	8	250
E1	9	208		L2	8	400
E2	11	82		E1	8	314
E5	9	59		E1	9	314
E5	10	59		E1	10	314
E5	8	51		E2	8	103
E5	8	69		E1	10	128
E5	8	60		L2	9	231
E5	9	60		L2	10	245
E5	10	72		L1	9	40
L1	8	378		L1	10	40
E1	10	218		E2	10	303
E1	9	259		L1	9	279
E1	9	605		L1	8	140
E1	10	605		E1	11	583
L2	9	390		L2	8	153
L2	10	240		L2	10	267
E1	8	132		E5	11	30
E1	9	358		E2	8	207
E5	10	49		L1	11	375
E6	9	38		E1	8	60
E6	11	38		L1	10	294
E5	8	61		E1	8	260
L2	9	338		E6	11	23
E5	9	73		E2	9	150
E5	8	47		E2	10	150
L1	9	295		E2	9	282
E2	8	151		L1	11	297
E2	9	151		L2	8	391
L1	11	196		L1	11	38
E1	9	274		L1	9	347
E1	10	568		E2	11	23
E1	11	451		E2	9	180
E4	10	57		E5	11	14
E1	9	59		L2	10	374
E1	8	395		L2	9	241

Table VIIA HPV6A
HLA-A1 Supermotif Peptides

E1	10	331		L1	8	58
L1	8	348		L1	10	58
L1	11	348		E5	8	36
L1	8	392		E5	10	58
E5	10	45		E5	11	58
L2	11	145		E2	8	92
L1	8	343		E2	11	92
L2	9	39		E4	8	12
E6	9	12		E4	10	12
E2	8	355		L2	8	435
L1	8	408		E1	9	579
E5	10	15		E1	11	579
E5	9	50		L1	9	230
E5	11	71		L1	8	358
E2	10	93		E2	9	159
E6	8	26		E2	10	159
L1	9	377		L1	9	350
E2	11	128		E2	11	168
L1	10	388		E2	8	138
L2	9	147		L1	8	26
L2	9	152		L1	9	26
L1	10	346		E2	8	131
L2	11	373				
L1	8	280				
E5	11	44				
E6	8	39				
E6	10	39				
E1	11	232				
L1	8	223				
E1	9	585				
E1	11	585				
E6	10	11				
L2	10	151				
L1	11	345				
L2	11	150				
E1	9	332				
E1	9	78				
L1	9	57				
L1	11	57				
E1	11	346				
E1	8	333				
E5	9	20				
E1	11	499				
E6	9	53				
E1	8	275				
L1	8	73				
E5	11	48				
E5	9	46				
L1	10	114				
L1	9	62				
E5	8	29				
E2	9	206				
L1	10	17				
L1	8	296				
L2	10	419				
L2	8	364				
L1	8	27				
L2	10	146				
E1	10	584				
L1	9	72				

Table VIIB HPV6B
HLA-A1 Supermotif Peptides

2	3	4
L2	11	286
E4	8	24
E1	11	520
E1	10	207
L1	8	81
L2	8	421
E6	8	37
E6	10	37
L2	9	288
E1	11	330
L1	9	342
E1	8	525
E6	11	10
E1	10	77
E1	10	601
E1	9	234
E6	11	67
E2	10	35
E6	11	131
E4	9	74
E1	10	369
L1	9	219
E6	10	96
E1	8	570
E1	10	570
E2	9	25
E2	9	313
E1	11	81
E1	10	203
E2	9	338
E1	9	42
L2	11	266
E7	9	44
L2	10	344
L1	9	198
E2	10	136
L2	10	120
L1	11	453
E1	10	604
E1	11	604
E1	9	131
E1	10	417
E2	11	100
E1	8	373
E2	8	80
E2	8	293
E2	10	293
L1	8	443
E2	10	205
E1	8	220
E6	8	126
E5A	9	16
E1	8	454
E1	11	454
L2	8	428
E5A	9	68
E1	10	393
L2	10	397
E1	9	446
L1	8	245

L2	11	239
E1	8	457
L1	8	450
E1	9	587
E2	8	171
E5A	9	28
L1	9	318
E1	10	243
E2	9	156
E1	11	217
E5B	8	15
E5B	10	25
E1	10	273
E1	8	11
L2	10	431
L2	11	431
L2	10	62
E1	10	431
L1	11	293
E2	10	179
L2	11	215
L2	8	64
E1	11	436
L1	9	407
L1	9	222
E1	8	316
L1	9	111
L1	11	113
L2	8	312
L2	9	312
L2	10	312
E6	8	119
E1	9	264
E2	10	78
E2	10	310
E6	10	50
E4	10	20
E2	10	149
E2	11	149
E6	9	25
L1	11	387
E1	9	581
L1	9	361
L1	11	361
E1	8	502
E1	9	502
E5A	8	21
E5A	10	31
E6	9	97
E5A	9	32
L2	10	44
L2	11	44
E5A	8	17
E1	10	500
E1	11	500
E1	9	571
L1	10	376
L2	8	247
E1	11	476
L2	9	121
E5A	10	34

Table VIIB HPV6B
HLA-A1 Supermotif Peptides

E1	8	433		E4	10	67
E6	8	73		E2	10	281
E6	10	73		L2	10	38
E1	10	312		E2	8	127
E1	11	312		E1	8	607
E1	9	254		L1	11	217
E1	8	357		L2	10	189
E1	10	357		E4	8	69
E1	10	228		L1	11	109
E1	11	484		L2	9	389
L1	10	56		E1	10	258
E6	11	116		L2	10	337
E6	8	52		L1	9	391
E6	10	52		L2	9	407
L1	10	51		E2	9	354
L1	8	19		L1	11	426
L1	10	71		L1	8	90
E1	8	255		L2	9	426
E2	8	314		L2	10	426
L2	9	246		E5A	10	19
E5A	8	33		L1	11	16
E5A	11	33		L2	9	363
L1	8	41		E5A	10	7
L1	9	41		L2	11	43
E1	10	521		L1	8	301
E1	9	208		E4	9	14
E5A	9	59		L1	8	250
E5A	10	59		L2	8	399
E5A	8	51		E1	8	314
E2	11	82		E1	9	314
E5A	8	69		E1	10	314
E5A	8	60		E2	8	103
E5A	9	60		E1	10	128
E5A	10	72		L2	9	231
L1	8	378		L2	10	245
E1	10	218		L1	9	40
L2	8	390		L1	10	40
E1	9	259		E2	10	303
E1	9	605		E2	9	84
E1	10	605		L1	9	279
L2	10	240		L1	8	140
E5B	11	3		E1	11	583
E1	8	132		L2	8	153
E1	9	358		L2	10	267
E5A	10	49		E5A	11	30
E6	9	38		E2	8	207
E6	11	38		L1	11	375
E5A	8	61		E1	8	60
L2	9	338		L1	10	294
E5A	9	73		E1	8	260
E5A	8	47		E6	11	23
L1	9	295		E2	9	150
E5B	9	26		E2	10	150
E2	8	151		E2	9	282
E2	9	151		L1	11	297
L1	11	196		L1	11	38
E1	9	274		L1	9	347
E1	10	568		E2	11	23
E1	11	451		E5A	11	14
E1	9	59		E2	9	180
E1	8	395		L2	10	374

Table VIIB HPV6B
HLA-A1 Supermotif Peptides

L2	9	241		L2	10	146
E1	10	331		E1	10	584
L1	8	348		L1	9	72
L1	11	348		L1	8	58
L1	8	392		L1	10	58
E5A	10	45		E5A	8	36
L2	11	145		E5B	10	13
L1	8	343		E5A	10	58
L2	9	39		E5A	11	58
E6	9	12		E2	8	92
E2	8	355		E2	11	92
L1	0	408		E4	8	22
E5A	9	50		E4	10	22
E5A	11	71		L2	8	435
E2	10	93		E1	9	579
E6	8	26		E1	11	579
L1	9	377		L1	9	230
E2	11	128		L1	8	358
E5B	10	59		E2	9	159
L1	10	388		E2	10	159
L2	9	147		L1	9	350
L2	9	152		E5B	9	62
L1	10	346		E4	8	9
L2	11	373		E2	11	168
L1	8	280		E2	8	138
E5A	11	44		L1	8	26
E6	8	39		L1	9	26
E6	10	39		E2	8	131
L1	8	223				
E1	11	232				
E5B	8	63				
E1	9	585				
E1	11	585				
E6	10	11				
L2	10	151				
L1	11	345				
L2	11	150				
E1	9	332				
L2	11	387				
E1	9	78				
L1	9	57				
L1	11	57				
E1	11	346				
E1	8	333				
E5A	9	20				
E1	11	499				
E6	9	53				
E1	8	275				
L1	8	73				
E5A	11	48				
E5A	9	46				
L1	10	114				
L1	9	62				
E5A	8	29				
E2	9	206				
L1	10	17				
L1	8	296				
E5B	11	58				
L2	8	364				
L2	11	418				
L1	8	27				

Table VIIC. HPV11
HLA-A1 Supermotif Peptides

2	3	4				
L2	11	285		E5	8	16
E1	11	520		L2	11	295
L1	8	81		L1	8	451
L2	8	417		E1	9	587
E6	8	37		E1	8	220
E6	10	37		L2	10	393
E1	11	330		L1	9	319
L1	9	343		E1	10	243
E1	8	525		E2	9	156
E6	11	10		E1	11	217
E1	10	77		E1	10	273
L1	8	349		L2	10	427
L1	11	349		L2	11	427
E5	10	26		E1	8	11
E1	10	601		L2	8	63
E6	11	67		L1	11	294
E5	8	73		E2	10	179
E5	9	73		E1	10	431
E4	9	73		L1	9	408
E1	10	369		L1	9	223
L1	9	220		E1	8	316
E2	9	25		L1	11	113
E6	10	96		L2	8	311
E1	10	203		L2	9	311
E1	8	570		E6	8	119
E1	10	570		E1	9	264
E1	11	81		E2	10	136
E1	9	42		E2	10	78
E2	8	292		E2	10	309
E2	10	292		E5	8	7
L2	10	343		E5	10	7
L1	9	199		E4	10	20
E5	9	12		E1	8	349
L1	8	125		E1	9	581
E2	9	312		E6	9	25
L1	11	454		L1	11	388
E6	9	69		L2	11	36
E1	10	604		L2	10	188
E1	11	604		L1	9	362
E1	9	131		L1	11	362
E1	10	417		E5	10	34
E2	11	100		E5	9	35
E1	8	373		E6	9	97
L2	11	265		L2	10	43
E2	8	80		L2	11	43
E1	10	128		E5	8	17
L1	8	444		E1	9	571
E2	10	205		E1	10	500
L2	10	119		E1	11	500
E6	8	126		L1	10	377
E1	11	454		L2	10	286
L2	8	424		E5	10	31
E1	9	494		E6	8	73
E5	9	68		E6	10	73
E5	10	68		E1	10	312
E1	10	393		E1	11	312
E1	9	446		E1	9	254
E1	8	457		E6	11	116
L2	11	238		E1	8	357
				E1	10	357

123

Table VIIC. HPV11
HLA-A1 Supermotif Peptides

E1	10	420		E5	8	54
L1	10	347		E2	8	127
E1	11	484		L1	11	218
E1	10	228		L2	8	385
E5	10	50		L2	9	385
E2	9	84		E1	10	258
L1	10	56		E4	8	68
E1	8	433		L2	10	336
L1	10	61		L1	9	392
L1	8	19		L2	9	403
L1	10	71		E2	9	353
E6	8	52		L1	11	427
E6	10	52		L2	11	206
E1	8	255		L1	8	90
E5	8	33		L2	9	422
E5	11	33		L2	10	422
E5	9	16		L2	10	358
E5	8	36		L1	11	16
L1	8	41		L2	11	42
L1	9	41		L1	8	302
E1	10	521		E4	9	14
E4	9	18		L1	8	251
E5	9	59		L2	8	395
E5	10	59		E1	8	314
E5	8	51		E1	9	314
E5	8	69		E1	10	314
E5	9	69		L2	9	230
E5	8	60		L2	9	297
E5	9	60		L1	9	40
L1	8	379		L1	10	40
E1	9	605		E2	10	302
E1	10	605		L2	10	244
E1	10	218		L1	9	280
L2	8	386		E1	8	205
E1	9	259		L1	8	141
L2	10	239		E1	11	583
E5	11	4		E2	8	207
E1	8	132		E2	11	23
E1	9	358		E6	9	12
E5	8	70		L2	10	266
E5	11	70		E1	8	422
E5	10	49		L1	11	376
E2	8	103		E5	11	30
E6	9	38		E6	11	23
E6	11	38		L1	10	295
E5	8	61		E1	8	260
L2	9	337		L1	11	298
E5	8	47		E2	9	337
L1	9	296		L1	11	38
L2	9	245		L2	9	208
E5	9	62		L1	8	281
E5	11	62		E2	9	150
E1	9	421		E2	10	150
L1	11	197		E2	11	260
E1	9	274		E1	11	206
E4	9	1		E2	9	180
E1	10	568		L2	8	209
E6	10	50		L2	10	370
E1	8	395		L2	9	240
E1	9	59		E1	10	331

Table VIIC. HPV11
HLA-A1 Supermotif Peptides

E2	8	151		E2	9	206
E2	9	151		L1	10	17
E1	8	60		L1	8	297
L2	8	152		L2	10	145
E1	11	436		L2	11	414
L1	8	393		E2	11	148
E5	10	45		E1	10	584
L1	8	344		L2	8	246
L2	11	144		L1	9	72
L2	9	38		E4	8	2
E2	10	261		L1	8	58
E2	8	354		L1	10	58
E5	10	71		L2	9	120
E5	11	71		E6	9	53
L1	8	409		E5	10	14
E1	10	207		E5	10	58
E5	10	15		E5	11	58
E5	9	50		E2	9	102
E2	10	93		E2	8	92
E6	8	26		E2	11	92
L1	9	378		E4	8	22
L1	10	389		L2	8	431
E6	10	11		E1	9	579
L2	9	287		E1	11	579
L2	10	207		E2	8	138
E2	10	149		L1	9	231
E2	11	149		L1	8	246
L2	11	369		L1	8	359
L2	9	151		E5	10	61
E5	11	44		E2	10	336
E6	8	39		E2	9	159
E6	10	39		E2	10	159
E1	11	232		L1	9	351
E1	9	585		L1	8	26
E1	11	585		L1	9	26
L2	10	37		E4	11	16
E5	11	14		E4	8	9
L2	10	150		E2	11	168
L2	11	149		E1	8	502
L2	11	382		E1	9	502
L1	8	224		E2	8	131
E1	9	332		SF 1168091 v1		
L2	10	383				
L2	11	383				
E1	9	78				
L1	9	57				
L1	11	57				
E1	11	346				
E1	8	333				
E1	11	499				
E5	9	27				
E5	9	32				
E4	10	17				
E1	8	275				
L1	8	73				
E5	11	48				
E5	9	46				
E2	11	128				
L1	10	114				
L1	9	62				

Table VIII
HLA-A2 Supermotif-Bearing Peptides

1	2	3	4	1	2	3	4
HPV16	E1	9	316	HPV16	E1	8	548
HPV16	E1	11	316	HPV16	E1	10	548
HPV16	E1	9	239	HPV16	E1	8	75
HPV16	E1	10	239	HPV16	E1	9	75
HPV16	E1	8	317	HPV16	E1	11	75
HPV16	E1	10	317	HPV16	E1	8	22
HPV16	E1	10	205	HPV16	E1	11	22
HPV16	E1	8	478	HPV16	E1	9	374
HPV16	E1	11	478	HPV16	E1	10	374
HPV16	E1	10	112	HPV16	E1	9	356
HPV16	E1	11	112	HPV16	E1	10	213
HPV16	E1	9	539	HPV16	E1	11	213
HPV16	E1	11	539	HPV16	E1	8	65
HPV16	E1	8	69	HPV16	E1	9	65
HPV16	E1	9	459	HPV16	E1	8	63
HPV16	E1	9	318	HPV16	E1	10	63
HPV16	E1	9	206	HPV16	E1	11	63
HPV16	E1	10	73	HPV16	E1	10	288
HPV16	E1	11	73	HPV16	E1	11	288
HPV16	E1	10	380	HPV16	E1	8	140
HPV16	E1	10	406	HPV16	E1	8	138
HPV16	E1	9	524	HPV16	E1	10	138
HPV16	E1	10	82	HPV16	E1	10	331
HPV16	E1	11	82	HPV16	E1	9	51
HPV16	E1	10	23	HPV16	E1	10	51
HPV16	E1	11	23	HPV16	E1	8	392
HPV16	E1	11	405	HPV16	E1	10	392
HPV16	E1	8	237	HPV16	E1	11	392
HPV16	E1	11	237	HPV16	E1	11	463
HPV16	E1	8	114	HPV16	E1	10	493
HPV16	E1	9	114	HPV16	E1	10	445
HPV16	E1	8	472	HPV16	E1	9	456
HPV16	E1	10	472	HPV16	E1	8	453
HPV16	E1	9	259	HPV16	E1	10	501
HPV16	E1	10	259	HPV16	E1	9	477
HPV16	E1	9	304	HPV16	E1	8	466
HPV16	E1	8	187	HPV16	E1	9	466
HPV16	E1	9	187	HPV16	E1	10	466
HPV16	E1	11	187	HPV16	E1	8	325
HPV16	E1	8	353	HPV16	E1	10	242
HPV16	E1	9	353	HPV16	E1	8	519
HPV16	E1	10	101	HPV16	E1	8	487
HPV16	E1	9	640	HPV16	E1	8	272
HPV16	E1	10	640	HPV16	E1	9	571
HPV16	E1	8	299	HPV16	E1	10	12
HPV16	E1	9	299	HPV16	E1	8	6
HPV16	E1	10	515	HPV16	E1	8	450
HPV16	E1	11	515	HPV16	E1	9	450
HPV16	E1	10	523	HPV16	E1	10	450
HPV16	E1	11	81	HPV16	E1	11	450
HPV16	E1	10	97	HPV16	E1	8	179
HPV16	E1	8	368	HPV16	E1	11	179
HPV16	E1	9	368	HPV16	E1	8	216
HPV16	E1	10	43	HPV16	E1	9	68
HPV16	E1	11	43	HPV16	E1	11	263
HPV16	E1	8	384	HPV16	E1	8	184
HPV16	E1	10	384	HPV16	E1	9	184
HPV16	E1	10	335	HPV16	E1	11	184
HPV16	E1	11	335	HPV16	E1	10	238
				HPV16	E1	11	238

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16 E1	8	247		HPV16 E1	8	474
HPV16 E1	9	247		HPV16 E1	9	490
HPV16 E1	8	375		HPV16 E1	10	490
HPV16 E1	9	375		HPV16 E1	10	464
HPV16 E1	11	375		HPV16 E1	11	464
HPV16 E1	9	473		HPV16 E1	9	494
HPV16 E1	10	194		HPV16 E1	9	346
HPV16 E1	10	264		HPV16 E1	9	510
HPV16 E1	11	264		HPV16 E1	11	510
HPV16 E1	9	564		HPV16 E1	8	255
HPV16 E1	8	369		HPV16 E1	10	255
HPV16 E1	8	401		HPV16 E1	9	145
HPV16 E1	10	442		HPV16 E1	11	145
HPV16 E1	8	52		HPV16 E1	8	457
HPV16 E1	9	52		HPV16 E1	11	457
HPV16 E1	11	52		HPV16 E1	8	191
HPV16 E1	11	204		HPV16 E1	10	191
HPV16 E1	11	111		HPV16 E1	9	243
HPV16 E1	8	517		HPV16 E1	11	243
HPV16 E1	9	517		HPV16 E1	8	59
HPV16 E1	10	517		HPV16 E1	9	59
HPV16 E1	8	400		HPV16 E1	11	59
HPV16 E1	9	400		HPV16 E1	9	554
HPV16 E1	8	296		HPV16 E1	10	554
HPV16 E1	10	296		HPV16 E1	11	554
HPV16 E1	11	296		HPV16 E1	11	222
HPV16 E1	9	292		HPV16 E1	11	544
HPV16 E1	8	311		HPV16 E1	8	91
HPV16 E1	9	311		HPV16 E1	10	306
HPV16 E1	9	77		HPV16 E1	11	306
HPV16 E1	10	77		HPV16 E1	8	207
HPV16 E1	9	418		HPV16 E1	11	207
HPV16 E1	10	117		HPV16 E1	10	144
HPV16 E1	10	323		HPV16 E1	8	305
HPV16 E1	9	252		HPV16 E1	11	305
HPV16 E1	11	252		HPV16 E1	10	360
HPV16 E1	8	199		HPV16 E1	11	360
HPV16 E1	9	199		HPV16 E1	11	569
HPV16 E1	10	199		HPV16 E1	8	202
HPV16 E1	11	199		HPV16 E1	8	538
HPV16 E1	8	267		HPV16 E1	10	538
HPV16 E1	9	267		HPV16 E1	8	193
HPV16 E1	10	267		HPV16 E1	11	193
HPV16 E1	11	267		HPV16 E1	9	328
HPV16 E1	8	513		HPV16 E1	8	105
HPV16 E1	9	513		HPV16 E1	9	105
HPV16 E1	8	382		HPV16 E1	11	105
HPV16 E1	10	382		HPV16 E1	10	535
HPV16 E1	10	208		HPV16 E1	11	535
HPV16 E1	8	563		HPV16 E1	9	136
HPV16 E1	10	563		HPV16 E1	10	136
HPV16 E1	9	297		HPV16 E1	9	480
HPV16 E1	10	297		HPV16 E1	11	480
HPV16 E1	11	297		HPV16 E1	8	196
HPV16 E1	9	562		HPV16 E1	10	196
HPV16 E1	11	562		HPV16 E1	11	196
HPV16 E1	9	254		HPV16 E1	10	4
HPV16 E1	11	254		HPV16 E1	9	512
HPV16 E1	8	293		HPV16 E1	10	512
HPV16 E1	11	293		HPV16 E1	8	561

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16	E1	10	561	HPV16	E1	10	458
HPV16	E1	9	94	HPV16	E1	11	72
HPV16	E1	8	190	HPV16	E1	8	185
HPV16	E1	9	190	HPV16	E1	10	185
HPV16	E1	11	190	HPV16	E1	11	185
HPV16	E1	10	553	HPV16	E1	9	289
HPV16	E1	11	553	HPV16	E1	10	289
HPV16	E1	11	302	HPV16	E1	8	253
HPV16	E1	11	636	HPV16	E1	10	253
HPV16	E1	9	61	HPV16	E1	9	407
HPV16	E1	10	61	HPV16	E1	8	60
HPV16	E1	9	398	HPV16	E1	10	60
HPV16	E1	10	398	HPV16	E1	11	60
HPV16	E1	11	398	HPV16	E1	11	344
HPV16	E1	11	441	HPV16	E1	8	525
HPV16	E1	9	381	HPV16	E1	8	85
HPV16	E1	11	381	HPV16	E1	11	85
HPV16	E1	8	556	HPV16	E1	9	197
HPV16	E1	9	556	HPV16	E1	10	197
HPV16	E1	10	556	HPV16	E1	11	197
HPV16	E1	11	143	HPV16	E1	10	345
HPV16	E1	8	419	HPV16	E1	9	443
HPV16	E1	11	359	HPV16	E1	8	555
HPV16	E1	9	256	HPV16	E1	9	555
HPV16	E1	8	188	HPV16	E1	10	555
HPV16	E1	10	188	HPV16	E1	11	555
HPV16	E1	11	188	HPV16	E1	9	83
HPV16	E1	8	146	HPV16	E1	10	83
HPV16	E1	10	146	HPV16	E1	9	361
HPV16	E1	8	84	HPV16	E1	10	361
HPV16	E1	9	84	HPV16	E1	9	24
HPV16	E1	9	414	HPV16	E1	10	24
HPV16	E1	8	615	HPV16	E1	8	363
HPV16	E1	11	432	HPV16	E1	9	425
HPV16	E1	10	390	HPV16	E1	8	339
HPV16	E1	8	246	HPV16	E1	8	509
HPV16	E1	9	246	HPV16	E1	10	509
HPV16	E1	10	246	HPV16	E1	11	379
HPV16	E1	11	250	HPV16	E1	9	531
HPV16	E1	8	266	HPV16	E1	10	531
HPV16	E1	9	266	HPV16	E1	8	261
HPV16	E1	10	266	HPV16	E1	8	578
HPV16	E1	11	266	HPV16	E1	10	578
HPV16	E1	8	484	HPV16	E1	9	58
HPV16	E1	11	484	HPV16	E1	10	58
HPV16	E1	10	489	HPV16	E1	9	90
HPV16	E1	11	489	HPV16	E1	10	448
HPV16	E1	8	634	HPV16	E1	11	448
HPV16	E1	9	546	HPV16	E1	10	20
HPV16	E1	10	546	HPV16	E2	8	220
HPV16	E1	10	397	HPV16	E2	9	220
HPV16	E1	11	397	HPV16	E2	10	220
HPV16	E1	11	423	HPV16	E2	8	72
HPV16	E1	11	314	HPV16	E2	10	72
HPV16	E1	8	231	HPV16	E2	11	72
HPV16	E1	9	231	HPV16	E2	9	41
HPV16	E1	10	231	HPV16	E2	9	228
HPV16	E1	10	315	HPV16	E2	10	228
HPV16	E1	8	66	HPV16	E2	11	228
HPV16	E1	11	66	HPV16	E2	9	69

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16	E2	10	69	HPV16	E2	8	136
HPV16	E2	11	69	HPV16	E2	10	136
HPV16	E2	8	221	HPV16	E2	11	136
HPV16	E2	9	221	HPV16	E2	8	214
HPV16	E2	11	221	HPV16	E2	9	214
HPV16	E2	9	226	HPV16	E2	11	214
HPV16	E2	11	226	HPV16	E2	8	290
HPV16	E2	8	63	HPV16	E2	9	290
HPV16	E2	10	63	HPV16	E2	8	35
HPV16	E2	11	63	HPV16	E2	8	56
HPV16	E2	9	314	HPV16	E2	9	55
HPV16	E2	10	40	HPV16	E2	9	223
HPV16	E2	8	109	HPV16	E2	11	252
HPV16	E2	9	109	HPV16	E2	11	210
HPV16	E2	11	109	HPV16	E2	10	15
HPV16	E2	11	300	HPV16	E2	10	238
HPV16	E2	11	5	HPV16	E2	8	356
HPV16	E2	10	309	HPV16	E2	10	356
HPV16	E2	10	174	HPV16	E2	8	288
HPV16	E2	8	294	HPV16	E2	10	288
HPV16	E2	9	124	HPV16	E2	11	288
HPV16	E2	9	344	HPV16	E2	8	68
HPV16	E2	8	246	HPV16	E2	10	68
HPV16	E2	9	246	HPV16	E2	11	68
HPV16	E2	11	246	HPV16	E2	10	45
HPV16	E2	8	96	HPV16	E2	10	225
HPV16	E2	9	96	HPV16	E2	11	14
HPV16	E2	10	96	HPV16	E2	8	351
HPV16	E2	11	142	HPV16	E2	10	351
HPV16	E2	8	209	HPV16	E2	8	255
HPV16	E2	8	74	HPV16	E2	11	255
HPV16	E2	9	74	HPV16	E2	10	354
HPV16	E2	11	48	HPV16	E2	11	182
HPV16	E2	9	2	HPV16	E2	8	215
HPV16	E2	8	185	HPV16	E2	10	215
HPV16	E2	9	185	HPV16	E2	8	62
HPV16	E2	10	185	HPV16	E2	9	62
HPV16	E2	8	118	HPV16	E2	11	62
HPV16	E2	11	118	HPV16	E2	10	256
HPV16	E2	8	204	HPV16	E2	8	70
HPV16	E2	8	100	HPV16	E2	9	70
HPV16	E2	11	100	HPV16	E2	10	70
HPV16	E2	10	346	HPV16	E2	8	94
HPV16	E2	11	346	HPV16	E2	10	94
HPV16	E2	8	168	HPV16	E2	11	94
HPV16	E2	9	156	HPV16	E2	8	75
HPV16	E2	11	156	HPV16	E2	8	103
HPV16	E2	8	150	HPV16	E2	9	16
HPV16	E2	11	150	HPV16	E2	11	16
HPV16	E2	8	190	HPV16	E2	9	127
HPV16	E2	10	190	HPV16	E2	11	127
HPV16	E2	8	230	HPV16	E2	8	284
HPV16	E2	9	230	HPV16	E2	8	9
HPV16	E2	8	187	HPV16	E2	9	9
HPV16	E2	11	187	HPV16	E2	8	325
HPV16	E2	8	29	HPV16	E2	9	325
HPV16	E2	10	29	HPV16	E2	10	325
HPV16	E2	9	53	HPV16	E2	11	325
HPV16	E2	10	53	HPV16	E2	8	219
HPV16	E2	11	53	HPV16	E2	9	219

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16	E2	10	219	HPV16 E2	8	227
HPV16	E2	11	219	HPV16 E2	10	227
HPV16	E2	9	287	HPV16 E2	11	227
HPV16	E2	11	287	HPV16 E2	8	192
HPV16	E2	11	106	HPV16 E2	10	119
HPV16	E2	10	60	HPV16 E2	11	119
HPV16	E2	11	60	HPV16 E2	8	145
HPV16	E2	10	196	HPV16 E2	11	147
HPV16	E2	8	71	HPV16 E2	10	341
HPV16	E2	9	71	HPV16 E2	11	321
HPV16	E2	11	71	HPV16 E2	10	134
HPV16	E2	10	151	HPV16 E2	8	92
HPV16	E2	9	191	HPV16 E2	10	92
HPV16	E2	8	349	HPV16 E2	8	138
HPV16	E2	9	349	HPV16 E2	9	138
HPV16	E2	10	349	HPV16 E2	10	138
HPV16	E2	8	57	HPV16 E2	11	138
HPV16	E2	8	278	HPV16 E2	9	102
HPV16	E2	9	278	HPV16 E2	11	312
HPV16	E2	11	278	HPV16 E2	9	131
HPV16	E2	10	37	HPV16 E2	11	115
HPV16	E2	9	7	HPV16 E2	8	159
HPV16	E2	10	7	HPV16 E2	11	159
HPV16	E2	11	7	HPV16 E5	9	53
HPV16	E2	9	212	HPV16 E5	10	53
HPV16	E2	10	212	HPV16 E5	8	26
HPV16	E2	11	212	HPV16 E5	9	26
HPV16	E2	11	165	HPV16 E5	11	26
HPV16	E2	8	98	HPV16 E5	9	24
HPV16	E2	10	98	HPV16 E5	10	24
HPV16	E2	8	348	HPV16 E5	11	24
HPV16	E2	9	348	HPV16 E5	8	20
HPV16	E2	10	348	HPV16 E5	9	20
HPV16	E2	11	348	HPV16 E5	10	20
HPV16	E2	9	85	HPV16 E5	8	5
HPV16	E2	10	85	HPV16 E5	9	5
HPV16	E2	8	23	HPV16 E5	8	60
HPV16	E2	10	317	HPV16 E5	10	60
HPV16	E2	8	261	HPV16 E5	10	72
HPV16	E2	9	261	HPV16 E5	11	72
HPV16	E2	10	261	HPV16 E5	8	15
HPV16	E2	8	198	HPV16 E5	9	15
HPV16	E2	9	144	HPV16 E5	11	15
HPV16	E2	11	269	HPV16 E5	8	66
HPV16	E2	10	313	HPV16 E5	9	66
HPV16	E2	11	237	HPV16 E5	11	66
HPV16	E2	9	355	HPV16 E5	8	75
HPV16	E2	11	355	HPV16 E5	9	75
HPV16	E2	9	61	HPV16 E5	8	64
HPV16	E2	10	61	HPV16 E5	10	64
HPV16	E2	8	3	HPV16 E5	11	64
HPV16	E2	9	93	HPV16 E5	9	43
HPV16	E2	11	93	HPV16 E5	10	43
HPV16	E2	9	310	HPV16 E5	11	43
HPV16	E2	8	128	HPV16 E5	8	44
HPV16	E2	10	128	HPV16 E5	9	44
HPV16	E2	10	253	HPV16 E5	10	44
HPV16	E2	11	285	HPV16 E5	11	44
HPV16	E2	10	116	HPV16 E5	11	51
HPV16	E2	9	357	HPV16 E5	9	61

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16 E5	11	61		HPV16 E5	8	9
HPV16 E5	10	12		HPV16 E5	9	9
HPV16 E5	11	12		HPV16 E5	8	21
HPV16 E5	9	73		HPV16 E5	9	21
HPV16 E5	10	73		HPV16 E5	8	46
HPV16 E5	11	73		HPV16 E5	9	46
HPV16 E5	8	42		HPV16 E5	11	46
HPV16 E5	10	42		HPV16 E5	9	63
HPV16 E5	11	42		HPV16 E5	11	63
HPV16 E5	9	28		HPV16 E5	9	68
HPV16 E5	11	28		HPV16 E5	11	68
HPV16 E5	11	11		HPV16 E5	8	39
HPV16 E5	8	16		HPV16 E5	9	39
HPV16 E5	10	16		HPV16 E5	10	39
HPV16 E5	8	22		HPV16 E5	11	39
HPV16 E5	11	22		HPV16 E6	8	110
HPV16 E5	8	27		HPV16 E6	11	58
HPV16 E5	10	27		HPV16 E6	8	73
HPV16 E5	9	32		HPV16 E6	10	143
HPV16 E5	11	32		HPV16 E6	8	23
HPV16 E5	8	47		HPV16 E6	11	23
HPV16 E5	10	47		HPV16 E6	8	37
HPV16 E5	8	33		HPV16 E6	9	37
HPV16 E5	10	33		HPV16 E6	9	25
HPV16 E5	11	33		HPV16 E6	10	25
HPV16 E5	9	48		HPV16 E6	11	25
HPV16 E5	8	45		HPV16 E6	8	96
HPV16 E5	9	45		HPV16 E6	11	96
HPV16 E5	10	45		HPV16 E6	10	48
HPV16 E5	9	1		HPV16 E6	8	52
HPV16 E5	10	1		HPV16 E6	9	52
HPV16 E5	11	1		HPV16 E6	11	9
HPV16 E5	8	3		HPV16 E6	11	125
HPV16 E5	9	3		HPV16 E6	11	34
HPV16 E5	10	3		HPV16 E6	10	59
HPV16 E5	11	3		HPV16 E6	11	59
HPV16 E5	9	70		HPV16 E6	9	18
HPV16 E5	8	31		HPV16 E6	11	18
HPV16 E5	10	31		HPV16 E6	9	41
HPV16 E5	8	55		HPV16 E6	11	107
HPV16 E5	10	55		HPV16 E6	10	44
HPV16 E5	11	55		HPV16 E6	8	26
HPV16 E5	8	41		HPV16 E6	9	26
HPV16 E5	9	41		HPV16 E6	10	26
HPV16 E5	11	41		HPV16 E6	11	134
HPV16 E5	9	8		HPV16 E6	10	102
HPV16 E5	10	8		HPV16 E6	11	116
HPV16 E5	8	37		HPV16 E6	8	12
HPV16 E5	9	37		HPV16 E6	11	12
HPV16 E5	10	37		HPV16 E6	9	20
HPV16 E5	11	37		HPV16 E6	10	20
HPV16 E5	8	35		HPV16 E6	11	20
HPV16 E5	9	35		HPV16 E6	8	21
HPV16 E5	10	35		HPV16 E6	9	21
HPV16 E5	11	35		HPV16 E6	10	21
HPV16 E5	10	52		HPV16 E6	11	43
HPV16 E5	11	52		HPV16 E6	8	42
HPV16 E5	8	6		HPV16 E6	10	97
HPV16 E5	11	6		HPV16 E6	11	97
HPV16 E5	8	10		HPV16 E6	8	27

Table VIII
HLA-A2 Supermotif-Bearing Peptides

Protein		Length	Position		Protein		Length	Position
HPV16	E6	9	27		HPV16	E7	10	11
HPV16	E6	8	151		HPV16	L1	8	372
HPV16	E6	10	29		HPV16	L1	9	372
HPV16	E6	10	94		HPV16	L1	8	451
HPV16	E6	8	28		HPV16	L1	11	451
HPV16	E6	11	28		HPV16	L1	8	373
HPV16	E6	11	93		HPV16	L1	9	233
HPV16	E6	8	67		HPV16	L1	8	342
HPV16	E7	9	68		HPV16	L1	10	330
HPV16	E7	11	68		HPV16	L1	8	513
HPV16	E7	8	75		HPV16	L1	10	513
HPV16	E7	9	75		HPV16	L1	11	513
HPV16	E7	10	75		HPV16	L1	8	35
HPV16	E7	9	81		HPV16	L1	10	35
HPV16	E7	10	81		HPV16	L1	10	292
HPV16	E7	9	14		HPV16	L1	9	70
HPV16	E7	8	21		HPV16	L1	10	205
HPV16	E7	9	4		HPV16	L1	9	371
HPV16	E7	10	4		HPV16	L1	10	371
HPV16	E7	9	37		HPV16	L1	9	172
HPV16	E7	11	18		HPV16	L1	11	172
HPV16	E7	8	43		HPV16	L1	9	183
HPV16	E7	9	85		HPV16	L1	8	454
HPV16	E7	10	73		HPV16	L1	11	251
HPV16	E7	11	73		HPV16	L1	11	329
HPV16	E7	11	54		HPV16	L1	8	397
HPV16	E7	8	82		HPV16	L1	11	397
HPV16	E7	9	82		HPV16	L1	10	300
HPV16	E7	8	83		HPV16	L1	11	300
HPV16	E7	11	83		HPV16	L1	9	225
HPV16	E7	8	15		HPV16	L1	10	225
HPV16	E7	8	12		HPV16	L1	10	486
HPV16	E7	9	12		HPV16	L1	11	486
HPV16	E7	11	12		HPV16	L1	9	154
HPV16	E7	10	41		HPV16	L1	10	154
HPV16	E7	8	6		HPV16	L1	10	228
HPV16	E7	10	6		HPV16	L1	11	228
HPV16	E7	11	44		HPV16	L1	8	120
HPV16	E7	8	49		HPV16	L1	10	120
HPV16	E7	9	66		HPV16	L1	9	113
HPV16	E7	11	66		HPV16	L1	8	361
HPV16	E7	8	77		HPV16	L1	10	361
HPV16	E7	10	77		HPV16	L1	10	442
HPV16	E7	11	77		HPV16	L1	11	442
HPV16	E7	8	71		HPV16	L1	9	412
HPV16	E7	9	71		HPV16	L1	11	17
HPV16	E7	10	63		HPV16	L1	9	34
HPV16	E7	9	78		HPV16	L1	11	34
HPV16	E7	10	78		HPV16	L1	8	279
HPV16	E7	8	86		HPV16	L1	8	132
HPV16	E7	9	7		HPV16	L1	10	132
HPV16	E7	9	64		HPV16	L1	10	474
HPV16	E7	11	64		HPV16	L1	8	245
HPV16	E7	10	19		HPV16	L1	10	245
HPV16	E7	8	69		HPV16	L1	8	400
HPV16	E7	10	69		HPV16	L1	9	400
HPV16	E7	11	69		HPV16	L1	10	400
HPV16	E7	10	55		HPV16	L1	11	400
HPV16	E7	11	55		HPV16	L1	8	5
HPV16	E7	9	11		HPV16	L1	9	494

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16 L1	8	402		HPV16 L1	10	406
HPV16 L1	9	402		HPV16 L1	8	151
HPV16 L1	10	402		HPV16 L1	10	151
HPV16 L1	11	25		HPV16 L1	11	262
HPV16 L1	8	506		HPV16 L1	8	178
HPV16 L1	9	506		HPV16 L1	9	90
HPV16 L1	11	506		HPV16 L1	9	46
HPV16 L1	11	236		HPV16 L1	10	46
HPV16 L1	9	282		HPV16 L1	9	312
HPV16 L1	11	282		HPV16 L1	10	69
HPV16 L1	8	446		HPV16 L1	8	184
HPV16 L1	8	356		HPV16 L1	11	216
HPV16 L1	11	356		HPV16 L1	11	68
HPV16 L1	8	232		HPV16 L1	8	148
HPV16 L1	10	232		HPV16 L1	11	148
HPV16 L1	11	291		HPV16 L1	8	495
HPV16 L1	8	348		HPV16 L1	8	239
HPV16 L1	10	348		HPV16 L1	10	239
HPV16 L1	11	348		HPV16 L1	10	398
HPV16 L1	8	142		HPV16 L1	11	398
HPV16 L1	11	142		HPV16 L1	8	432
HPV16 L1	9	499		HPV16 L1	9	432
HPV16 L1	10	499		HPV16 L1	11	339
HPV16 L1	9	431		HPV16 L1	8	94
HPV16 L1	10	431		HPV16 L1	10	94
HPV16 L1	9	93		HPV16 L1	9	409
HPV16 L1	11	93		HPV16 L1	10	9
HPV16 L1	8	136		HPV16 L1	8	87
HPV16 L1	10	438		HPV16 L1	8	124
HPV16 L1	11	438		HPV16 L1	10	124
HPV16 L1	8	64		HPV16 L1	8	1
HPV16 L1	8	166		HPV16 L1	9	1
HPV16 L1	10	166		HPV16 L1	10	1
HPV16 L1	10	130		HPV16 L1	11	1
HPV16 L1	9	140		HPV16 L1	10	414
HPV16 L1	10	140		HPV16 L1	11	414
HPV16 L1	8	62		HPV16 L1	8	226
HPV16 L1	9	62		HPV16 L1	9	226
HPV16 L1	10	62		HPV16 L1	10	263
HPV16 L1	8	22		HPV16 L1	8	325
HPV16 L1	10	22		HPV16 L1	10	164
HPV16 L1	8	285		HPV16 L1	9	157
HPV16 L1	9	285		HPV16 L1	11	157
HPV16 L1	11	457		HPV16 L1	8	58
HPV16 L1	10	452		HPV16 L1	11	58
HPV16 L1	9	424		HPV16 L1	10	311
HPV16 L1	11	8		HPV16 L1	8	476
HPV16 L1	9	86		HPV16 L1	10	476
HPV16 L1	9	221		HPV16 L1	8	367
HPV16 L1	8	11		HPV16 L1	10	367
HPV16 L1	10	11		HPV16 L1	8	353
HPV16 L1	8	407		HPV16 L1	10	353
HPV16 L1	9	407		HPV16 L1	11	353
HPV16 L1	11	407		HPV16 L1	8	383
HPV16 L1	8	501		HPV16 L1	9	218
HPV16 L1	9	512		HPV16 L1	10	218
HPV16 L1	11	512		HPV16 L1	8	296
HPV16 L1	10	85		HPV16 L1	9	19
HPV16 L1	8	406		HPV16 L1	11	19
HPV16 L1	9	406		HPV16 L1	8	460

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16 L1	10	77		HPV16 L1	9	365
HPV16 L1	11	77		HPV16 L1	10	365
HPV16 L1	8	247		HPV16 L1	10	375
HPV16 L1	8	213		HPV16 L1	11	521
HPV16 L1	9	213		HPV16 L1	8	410
HPV16 L1	8	489		HPV16 L1	11	410
HPV16 L1	10	489		HPV16 L1	9	523
HPV16 L1	11	138		HPV16 L1	10	423
HPV16 L1	10	466		HPV16 L1	9	439
HPV16 L1	9	147		HPV16 L1	10	439
HPV16 L1	8	319		HPV16 L1	8	507
HPV16 L1	9	319		HPV16 L1	10	507
HPV16 L1	8	515		HPV16 L1	11	507
HPV16 L1	9	515		HPV16 L1	9	238
HPV16 L1	10	515		HPV16 L1	11	238
HPV16 L1	8	41		HPV16 L1	8	408
HPV16 L1	10	41		HPV16 L1	10	408
HPV16 L1	8	43		HPV16 L1	9	121
HPV16 L1	11	497		HPV16 L1	11	121
HPV16 L1	9	450		HPV16 L1	10	522
HPV16 L1	9	240		HPV16 L1	10	237
HPV16 L1	11	240		HPV16 L1	9	362
HPV16 L1	9	331		HPV16 L1	11	362
HPV16 L1	8	403		HPV16 L1	8	516
HPV16 L1	9	403		HPV16 L1	9	516
HPV16 L1	11	403		HPV16 L1	8	219
HPV16 L1	11	181		HPV16 L1	9	219
HPV16 L1	9	354		HPV16 L1	11	219
HPV16 L1	10	354		HPV16 L1	9	358
HPV16 L1	11	280		HPV16 L1	11	358
HPV16 L1	10	26		HPV16 L1	9	36
HPV16 L1	11	26		HPV16 L1	10	54
HPV16 L1	8	2		HPV16 L1	11	204
HPV16 L1	9	2		HPV16 L1	8	220
HPV16 L1	10	2		HPV16 L1	10	220
HPV16 L1	11	2		HPV16 L1	9	10
HPV16 L1	9	289		HPV16 L1	11	10
HPV16 L1	9	341		HPV16 L1	8	413
HPV16 L1	9	123		HPV16 L1	11	413
HPV16 L1	11	123		HPV16 L1	8	3
HPV16 L1	8	56		HPV16 L1	9	3
HPV16 L1	10	56		HPV16 L1	10	3
HPV16 L1	9	482		HPV16 L1	10	357
HPV16 L1	9	159		HPV16 L1	8	359
HPV16 L1	9	253		HPV16 L1	10	359
HPV16 L1	11	253		HPV16 L1	8	47
HPV16 L1	8	369		HPV16 L1	9	47
HPV16 L1	11	369		HPV16 L1	11	47
HPV16 L1	11	271		HPV16 L1	8	126
HPV16 L1	8	28		HPV16 L1	8	30
HPV16 L1	9	28		HPV16 L1	10	30
HPV16 L1	10	28		HPV16 L1	8	416
HPV16 L1	9	174		HPV16 L1	9	416
HPV16 L1	11	174		HPV16 L1	10	416
HPV16 L1	9	324		HPV16 L1	8	302
HPV16 L1	10	449		HPV16 L1	9	302
HPV16 L1	9	49		HPV16 L1	11	302
HPV16 L1	11	49		HPV16 L1	10	38
HPV16 L1	11	422		HPV16 L1	11	38
HPV16 L1	8	365		HPV16 L1	10	389

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16	L1	9	275	HPV16	L2	11	283
HPV16	L1	8	470	HPV16	L2	11	163
HPV16	L1	11	53	HPV16	L2	8	181
HPV16	L2	11	355	HPV16	L2	10	181
HPV16	L2	8	144	HPV16	L2	9	118
HPV16	L2	9	144	HPV16	L2	8	404
HPV16	L2	10	144	HPV16	L2	8	259
HPV16	L2	11	144	HPV16	L2	8	59
HPV16	L2	8	288	HPV16	L2	10	57
HPV16	L2	10	356	HPV16	L2	11	364
HPV16	L2	9	293	HPV16	L2	10	226
HPV16	L2	8	82	HPV16	L2	8	26
HPV16	L2	11	15	HPV16	L2	11	26
HPV16	L2	8	116	HPV16	L2	9	65
HPV16	L2	11	116	HPV16	L2	11	65
HPV16	L2	10	31	HPV16	L2	10	61
HPV16	L2	11	31	HPV16	L2	8	76
HPV16	L2	8	147	HPV16	L2	10	76
HPV16	L2	9	147	HPV16	L2	11	76
HPV16	L2	10	147	HPV16	L2	9	52
HPV16	L2	11	147	HPV16	L2	11	52
HPV16	L2	10	415	HPV16	L2	8	354
HPV16	L2	9	285	HPV16	L2	9	440
HPV16	L2	10	285	HPV16	L2	11	41
HPV16	L2	11	285	HPV16	L2	8	277
HPV16	L2	8	367	HPV16	L2	10	277
HPV16	L2	9	367	HPV16	L2	11	277
HPV16	L2	11	367	HPV16	L2	10	439
HPV16	L2	9	422	HPV16	L2	9	32
HPV16	L2	10	422	HPV16	L2	10	32
HPV16	L2	9	43	HPV16	L2	11	32
HPV16	L2	11	43	HPV16	L2	8	145
HPV16	L2	11	199	HPV16	L2	9	145
HPV16	L2	10	84	HPV16	L2	10	145
HPV16	L2	11	84	HPV16	L2	11	145
HPV16	L2	10	376	HPV16	L2	9	45
HPV16	L2	9	140	HPV16	L2	8	420
HPV16	L2	8	129	HPV16	L2	9	420
HPV16	L2	9	129	HPV16	L2	11	420
HPV16	L2	11	129	HPV16	L2	9	374
HPV16	L2	8	338	HPV16	L2	8	344
HPV16	L2	11	338	HPV16	L2	9	344
HPV16	L2	8	195	HPV16	L2	8	243
HPV16	L2	9	195	HPV16	L2	9	243
HPV16	L2	11	195	HPV16	L2	8	135
HPV16	L2	9	340	HPV16	L2	10	135
HPV16	L2	11	340	HPV16	L2	11	135
HPV16	L2	8	176	HPV16	L2	11	250
HPV16	L2	9	111	HPV16	L2	8	286
HPV16	L2	11	111	HPV16	L2	9	286
HPV16	L2	8	114	HPV16	L2	10	286
HPV16	L2	10	114	HPV16	L2	9	430
HPV16	L2	8	373	HPV16	L2	10	430
HPV16	L2	10	373	HPV16	L2	11	430
HPV16	L2	8	242	HPV16	L2	8	105
HPV16	L2	9	242	HPV16	L2	11	105
HPV16	L2	10	242	HPV16	L2	8	202
HPV16	L2	9	201	HPV16	L2	9	202
HPV16	L2	10	201	HPV16	L2	10	202
HPV16	L2	11	201	HPV16	L2	9	248

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16	L2	10	23		HPV16	L2	9	435
HPV16	L2	11	23		HPV16	L2	8	80
HPV16	L2	8	20		HPV16	L2	10	80
HPV16	L2	8	39		HPV16	L2	8	161
HPV16	L2	8	35		HPV16	L2	9	161
HPV16	L2	11	35		HPV16	L2	11	246
HPV16	L2	10	323		HPV16	L2	11	172
HPV16	L2	11	323		HPV16	L2	8	358
HPV16	L2	8	236		HPV16	L2	11	358
HPV16	L2	9	236		HPV16	L2	11	120
HPV16	L2	10	236		HPV16	L2	11	221
HPV16	L2	8	86		HPV16	L2	9	97
HPV16	L2	9	86		HPV16	L2	10	97
HPV16	L2	10	86		HPV16	L2	8	381
HPV16	L2	8	249		HPV16	L2	10	381
HPV16	L2	9	169		HPV16	L2	8	88
HPV16	L2	8	341		HPV16	L2	11	88
HPV16	L2	10	341		HPV16	L2	9	24
HPV16	L2	11	341		HPV16	L2	10	24
HPV16	L2	8	46		HPV16	L2	8	423
HPV16	L2	8	294		HPV16	L2	9	423
HPV16	L2	8	108		HPV16	L2	8	44
HPV16	L2	10	108		HPV16	L2	10	44
HPV16	L2	9	410		HPV16	L2	9	17
HPV16	L2	11	410		HPV16	L2	11	17
HPV16	L2	9	454		HPV16	L2	9	233
HPV16	L2	9	276		HPV16	L2	11	233
HPV16	L2	11	276		HPV16	L2	9	342
HPV16	L2	10	407		HPV16	L2	10	342
HPV16	L2	9	419		HPV16	L2	11	342
HPV16	L2	10	419		HPV16	L2	11	310
HPV16	L2	9	397		HPV16	L2	8	234
HPV16	L2	9	208		HPV16	L2	10	234
HPV16	L2	8	150		HPV16	L2	11	234
HPV16	L2	9	174		HPV16	L2	10	12
HPV16	L2	10	174		HPV16	L2	8	305
HPV16	L2	8	240		HPV16	L2	10	305
HPV16	L2	10	240		HPV16	L2	8	224
HPV16	L2	11	240		HPV16	L2	9	224
HPV16	L2	9	143		HPV16	L2	9	461
HPV16	L2	10	143		HPV16	L2	11	461
HPV16	L2	11	143		HPV16	L2	9	298
HPV16	L2	8	292		HPV16	L2	9	69
HPV16	L2	10	292		HPV16	L2	8	9
HPV16	L2	11	395		HPV16	L2	10	9
HPV16	L2	8	255		HPV16	L2	8	313
HPV16	L2	11	255		HPV16	L2	10	313
HPV16	L2	8	417		HPV16	L2	8	230
HPV16	L2	11	417		HPV16	L2	9	230
HPV16	L2	8	215		HPV16	L2	9	335
HPV16	L2	9	215		HPV16	L2	10	335
HPV16	L2	11	215		HPV16	L2	11	335
HPV16	L2	10	429		HPV16	L2	8	6
HPV16	L2	11	429		HPV16	L2	10	6
HPV16	L2	8	74		HPV16	L2	11	6
HPV16	L2	9	74		HPV16	L2	8	14
HPV16	L2	10	74		HPV16	L2	11	274
HPV16	L2	8	409		HPV16	L2	9	360
HPV16	L2	10	409		HPV16	L2	11	360
HPV16	L2	9	197		HPV16	L2	11	125

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV16	L2	8	134		HPV16	L2	9	351
HPV16	L2	9	134		HPV16	L2	11	351
HPV16	L2	11	134		HPV16	L2	9	136
HPV16	L2	9	104		HPV16	L2	10	136
HPV16	L2	8	389		HPV16	L2	11	136
HPV16	L2	10	389		HPV16	L2	8	350
HPV16	L2	11	389		HPV16	L2	10	350
HPV16	L2	9	107		HPV16	L2	10	153
HPV16	L2	11	107		HPV16	L2	8	209
HPV16	L2	9	50		HPV16	L2	9	154
HPV16	L2	11	50		HPV16	L2	11	154
HPV16	L2	8	138		HPV16	L2	8	287
HPV16	L2	9	138		HPV16	L2	9.	287
HPV16	L2	11	138		HPV16	L2	10	222
HPV16	L2	8	189		HPV16	L2	11	222
HPV16	L2	10	189		HPV16	L2	8	168
HPV16	L2	9	331		HPV16	L2	10	168
HPV16	L2	11	331		HPV16	L2	8	155
HPV16	L2	11	186		HPV16	L2	10	155
HPV16	L2	8	204		HPV16	L2	11	152
HPV16	L2	11	204		HPV16	L2	8	237
HPV16	L2	10	213		HPV16	L2	9	237
HPV16	L2	11	213		HPV16	L2	11	237
HPV16	L2	8	387		HPV16	L2	9	369
HPV16	L2	10	387		HPV16	L2	11	369
HPV16	L2	8	378		HPV16	L2	8	393
HPV16	L2	11	378		HPV16	L2	10	72
HPV16	L2	9	347		HPV16	L2	11	72
HPV16	L2	10	347		HPV16	L2	8	447
HPV16	L2	11	347		HPV16	L2	9	447
HPV16	L2	9	167		HPV16	L2	10	453
HPV16	L2	11	167		HPV16	L2	8	349
HPV16	L2	9	122		HPV16	L2	9	349
HPV16	L2	11	384		HPV16	L2	11	349
HPV16	L2	9	81		HPV18	E1	11	396
HPV16	L2	8	332		HPV18	E1	10	397
HPV16	L2	10	332		HPV18	E1	8	324
HPV16	L2	11	438		HPV18	E1	10	324
HPV16	L2	10	399		HPV18	E1	8	246
HPV16	L2	10	187		HPV18	E1	9	246
HPV16	L2	8	343		HPV18	E1	10	246
HPV16	L2	9	343		HPV18	E1	8	22
HPV16	L2	10	343		HPV18	E1	11	22
HPV16	L2	9	85		HPV18	E1	9	546
HPV16	L2	10	85		HPV18	E1	8	68
HPV16	L2	11	85		HPV18	E1	9	466
HPV16	L2	10	311		HPV18	E1	10	387
HPV16	L2	9	182		HPV18	E1	11	387
HPV16	L2	11	265		HPV18	E1	9	325
HPV16	L2	10	16		HPV18	E1	9	213
HPV16	L2	10	232		HPV18	E1	8	526
HPV16	L2	9	156		HPV18	E1	9	526
HPV16	L2	8	398		HPV18	E1	10	66
HPV16	L2	11	398		HPV18	E1	8	72
HPV16	L2	8	141		HPV18	E1	10	72
HPV16	L2	11	141		HPV18	E1	11	72
HPV16	L2	8	244		HPV18	E1	8	422
HPV16	L2	10	379		HPV18	E1	9	199
HPV16	L2	8	231		HPV18	E1	8	40
HPV16	L2	11	231		HPV18	E1	9	40

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	E1	10	413		HPV18	E1	11	59
HPV18	E1	8	144		HPV18	E1	9	64
HPV18	E1	11	531		HPV18	E1	11	309
HPV18	E1	9	216		HPV18	E1	10	104
HPV18	E1	9	504		HPV18	E1	9	141
HPV18	E1	11	412		HPV18	E1	10	141
HPV18	E1	8	273		HPV18	E1	11	141
HPV18	E1	9	273		HPV18	E1	8	74
HPV18	E1	10	273		HPV18	E1	9	74
HPV18	E1	11	273		HPV18	E1	11	74
HPV18	E1	8	479		HPV18	E1	10	338
HPV18	E1	10	479		HPV18	E1	11	89
HPV18	E1	9	311		HPV18	E1	8	497
HPV18	E1	10	404		HPV18	E1	9	497
HPV18	E1	11	404		HPV18	E1	10	497
HPV18	E1	8	240		HPV18	E1	10	265
HPV18	E1	11	240		HPV18	E1	10	500
HPV18	E1	9	196		HPV18	E1	8	460
HPV18	E1	10	196		HPV18	E1	9	463
HPV18	E1	11	635		HPV18	E1	11	470
HPV18	E1	8	78		HPV18	E1	8	399
HPV18	E1	8	530		HPV18	E1	11	399
HPV18	E1	9	628		HPV18	E1	10	452
HPV18	E1	11	628		HPV18	E1	11	452
HPV18	E1	11	203		HPV18	E1	10	508
HPV18	E1	9	363		HPV18	E1	10	465
HPV18	E1	11	228		HPV18	E1	10	212
HPV18	E1	8	381		HPV18	E1	10	503
HPV18	E1	9	381		HPV18	E1	9	356
HPV18	E1	10	381		HPV18	E1	8	332
HPV18	E1	8	46		HPV18	E1	9	332
HPV18	E1	11	46		HPV18	E1	8	223
HPV18	E1	9	637		HPV18	E1	8	300
HPV18	E1	8	106		HPV18	E1	11	300
HPV18	E1	11	106		HPV18	E1	8	494
HPV18	E1	10	42		HPV18	E1	11	494
HPV18	E1	10	522		HPV18	E1	9	121
HPV18	E1	11	522		HPV18	E1	11	121
HPV18	E1	9	342		HPV18	E1	9	172
HPV18	E1	10	342		HPV18	E1	9	55
HPV18	E1	11	342		HPV18	E1	11	55
HPV18	E1	10	52		HPV18	E1	10	11
HPV18	E1	8	220		HPV18	E1	8	473
HPV18	E1	10	220		HPV18	E1	9	473
HPV18	E1	11	220		HPV18	E1	8	182
HPV18	E1	8	540		HPV18	E1	11	182
HPV18	E1	11	30		HPV18	E1	8	279
HPV18	E1	8	166		HPV18	E1	9	71
HPV18	E1	8	143		HPV18	E1	11	71
HPV18	E1	9	143		HPV18	E1	11	270
HPV18	E1	11	115		HPV18	E1	8	83
HPV18	E1	8	62		HPV18	E1	8	306
HPV18	E1	11	62		HPV18	E1	9	306
HPV18	E1	9	108		HPV18	E1	8	254
HPV18	E1	11	108		HPV18	E1	9	254
HPV18	E1	8	375		HPV18	E1	8	198
HPV18	E1	9	375		HPV18	E1	10	198
HPV18	E1	11	366		HPV18	E1	10	569
HPV18	E1	8	59		HPV18	E1	9	266
HPV18	E1	10	59		HPV18	E1	10	271

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	E1	11	271	HPV18	E1	9	520
HPV18	E1	9	501	HPV18	E1	8	350
HPV18	E1	8	562	HPV18	E1	8	571
HPV18	E1	9	562	HPV18	E1	9	295
HPV18	E1	10	562	HPV18	E1	10	295
HPV18	E1	11	562	HPV18	E1	11	295
HPV18	E1	8	262	HPV18	E1	9	480
HPV18	E1	10	262	HPV18	E1	10	229
HPV18	E1	10	314	HPV18	E1	11	229
HPV18	E1	11	314	HPV18	E1	8	382
HPV18	E1	11	347	HPV18	E1	9	382
HPV18	E1	11	461	HPV18	E1	8	214
HPV18	E1	9	590	HPV18	E1	11	214
HPV18	E1	9	23	HPV18	E1	8	527
HPV18	E1	10	23	HPV18	E1	11	527
HPV18	E1	10	449	HPV18	E1	8	312
HPV18	E1	8	124	HPV18	E1	10	47
HPV18	E1	9	124	HPV18	E1	10	367
HPV18	E1	11	439	HPV18	E1	11	367
HPV18	E1	11	647	HPV18	E1	8	545
HPV18	E1	8	318	HPV18	E1	10	545
HPV18	E1	9	318	HPV18	E1	9	39
HPV18	E1	8	210	HPV18	E1	10	39
HPV18	E1	8	259	HPV18	E1	10	188
HPV18	E1	9	259	HPV18	E1	11	188
HPV18	E1	11	259	HPV18	E1	9	335
HPV18	E1	8	237	HPV18	E1	9	487
HPV18	E1	9	237	HPV18	E1	8	158
HPV18	E1	10	237	HPV18	E1	10	158
HPV18	E1	11	237	HPV18	E1	11	158
HPV18	E1	8	524	HPV18	E1	8	191
HPV18	E1	9	524	HPV18	E1	9	191
HPV18	E1	10	524	HPV18	E1	11	191
HPV18	E1	11	524	HPV18	E1	10	577
HPV18	E1	8	206	HPV18	E1	11	485
HPV18	E1	9	206	HPV18	E1	8	568
HPV18	E1	10	206	HPV18	E1	11	568
HPV18	E1	11	206	HPV18	E1	11	551
HPV18	E1	8	389	HPV18	E1	11	448
HPV18	E1	9	389	HPV18	E1	8	98
HPV18	E1	10	389	HPV18	E1	10	98
HPV18	E1	10	215	HPV18	E1	10	560
HPV18	E1	9	561	HPV18	E1	11	560
HPV18	E1	10	561	HPV18	E1	8	519
HPV18	E1	11	561	HPV18	E1	9	519
HPV18	E1	9	261	HPV18	E1	10	519
HPV18	E1	11	261	HPV18	E1	8	194
HPV18	E1	11	313	HPV18	E1	11	194
HPV18	E1	9	388	HPV18	E1	9	252
HPV18	E1	10	388	HPV18	E1	10	252
HPV18	E1	11	388	HPV18	E1	11	252
HPV18	E1	9	304	HPV18	E1	9	60
HPV18	E1	10	304	HPV18	E1	10	60
HPV18	E1	11	304	HPV18	E1	8	21
HPV18	E1	10	204	HPV18	E1	11	21
HPV18	E1	11	204	HPV18	E1	9	405
HPV18	E1	11	285	HPV18	E1	10	405
HPV18	E1	9	570	HPV18	E1	11	405
HPV18	E1	8	376	HPV18	E1	9	67
HPV18	E1	8	520	HPV18	E1	8	457

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18 E1	10	457		HPV18 E1	10	150
HPV18 E1	11	457		HPV18 E1	10	532
HPV18 E1	8	563		HPV18 E1	8	296
HPV18 E1	9	563		HPV18 E1	9	296
HPV18 E1	10	563		HPV18 E1	10	296
HPV18 E1	11	563		HPV18 E1	8	591
HPV18 E1	8	200		HPV18 E1	9	323
HPV18 E1	8	426		HPV18 E1	11	323
HPV18 E1	9	456		HPV18 E1	8	297
HPV18 E1	11	456		HPV18 E1	9	297
HPV18 E1	11	80		HPV18 E1	11	297
HPV18 E1	9	649		HPV18 E1	8	525
HPV18 E1	9	421		HPV18 E1	9	525
HPV18 E1	10	589		HPV18 E1	10	525
HPV18 E1	11	626		HPV18 E1	10	31
HPV18 E1	8	102		HPV18 E1	11	31
HPV18 E1	9	349		HPV18 E1	8	505
HPV18 E1	8	294		HPV18 E1	10	81
HPV18 E1	10	294		HPV18 E1	11	84
HPV18 E1	11	294		HPV18 E1	9	339
HPV18 E1	9	425		HPV18 E1	9	20
HPV18 E1	10	330		HPV18 E1	9	450
HPV18 E1	11	330		HPV18 E1	9	368
HPV18 E1	8	622		HPV18 E1	10	368
HPV18 E1	9	553		HPV18 E1	10	244
HPV18 E1	10	553		HPV18 E1	11	244
HPV18 E1	9	117		HPV18 E1	11	149
HPV18 E1	11	430		HPV18 E1	8	370
HPV18 E1	10	164		HPV18 E1	8	346
HPV18 E1	11	93		HPV18 E1	9	432
HPV18 E1	9	302		HPV18 E1	8	516
HPV18 E1	11	302		HPV18 E1	10	516
HPV18 E1	10	511		HPV18 E1	11	516
HPV18 E1	11	511		HPV18 E1	8	536
HPV18 E1	10	322		HPV18 E1	11	536
HPV18 E1	11	179		HPV18 E1	8	243
HPV18 E1	9	245		HPV18 E1	11	243
HPV18 E1	10	245		HPV18 E1	11	386
HPV18 E1	11	245		HPV18 E1	8	585
HPV18 E1	8	65		HPV18 E1	8	408
HPV18 E1	11	65		HPV18 E1	11	542
HPV18 E1	8	253		HPV18 E1	8	455
HPV18 E1	9	253		HPV18 E1	10	455
HPV18 E1	10	253		HPV18 E1	10	19
HPV18 E1	8	197		HPV18 E2	9	49
HPV18 E1	9	197		HPV18 E2	10	49
HPV18 E1	11	197		HPV18 E2	10	245
HPV18 E1	8	260		HPV18 E2	11	245
HPV18 E1	10	260		HPV18 E2	8	76
HPV18 E1	8	303		HPV18 E2	11	76
HPV18 E1	10	303		HPV18 E2	11	45
HPV18 E1	11	303		HPV18 E2	8	351
HPV18 E1	9	414		HPV18 E2	9	351
HPV18 E1	9	53		HPV18 E2	10	351
HPV18 E1	11	53		HPV18 E2	11	87
HPV18 E1	8	238		HPV18 E2	9	154
HPV18 E1	9	238		HPV18 E2	8	214
HPV18 E1	10	238		HPV18 E2	11	214
HPV18 E1	9	533		HPV18 E2	9	246
HPV18 E1	11	533		HPV18 E2	10	246

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	E2	10	132	HPV18	E2	8	329
HPV18	E2	10	156	HPV18	E2	8	238
HPV18	E2	8	146	HPV18	E2	9	238
HPV18	E2	9	146	HPV18	E2	10	238
HPV18	E2	10	146	HPV18	E2	10	254
HPV18	E2	11	29	HPV18	E2	8	86
HPV18	E2	9	315	HPV18	E2	8	39
HPV18	E2	11	315	HPV18	E2	11	39
HPV18	E2	9	100	HPV18	E2	8	266
HPV18	E2	8	210	HPV18	E2	8	98
HPV18	E2	9	210	HPV18	E2	11	98
HPV18	E2	9	78	HPV18	E2	11	83
HPV18	E2	10	78	HPV18	E2	11	221
HPV18	E2	8	104	HPV18	E2	8	79
HPV18	E2	10	6	HPV18	E2	9	79
HPV18	E2	8	340	HPV18	E2	9	333
HPV18	E2	10	340	HPV18	E2	8	217
HPV18	E2	11	340	HPV18	E2	8	1
HPV18	E2	8	190	HPV18	E2	10	144
HPV18	E2	9	190	HPV18	E2	11	144
HPV18	E2	8	48	HPV18	E2	9	133
HPV18	E2	10	48	HPV18	E2	10	67
HPV18	E2	11	48	HPV18	E2	11	67
HPV18	E2	11	346	HPV18	E2	8	285
HPV18	E2	9	324	HPV18	E2	9	348
HPV18	E2	10	324	HPV18	E2	11	348
HPV18	E2	11	324	HPV18	E2	9	196
HPV18	E2	11	331	HPV18	E2	10	64
HPV18	E2	9	54	HPV18	E2	9	265
HPV18	E2	10	54	HPV18	E2	10	272
HPV18	E2	11	253	HPV18	E2	11	110
HPV18	E2	9	85	HPV18	E2	8	262
HPV18	E2	11	161	HPV18	E2	9	262
HPV18	E2	9	235	HPV18	E2	10	262
HPV18	E2	11	235	HPV18	E2	8	357
HPV18	E2	8	148	HPV18	E2	9	357
HPV18	E2	10	148	HPV18	E2	8	33
HPV18	E2	11	187	HPV18	E2	8	38
HPV18	E2	9	291	HPV18	E2	9	38
HPV18	E2	9	60	HPV18	E2	9	216
HPV18	E2	9	223	HPV18	E2	8	80
HPV18	E2	10	223	HPV18	E2	8	56
HPV18	E2	11	289	HPV18	E2	10	56
HPV18	E2	10	332	HPV18	E2	11	2
HPV18	E2	8	358	HPV18	E2	8	61
HPV18	E2	8	55	HPV18	E2	9	11
HPV18	E2	9	55	HPV18	E2	10	11
HPV18	E2	11	55	HPV18	E2	8	343
HPV18	E2	8	72	HPV18	E2	9	343
HPV18	E2	10	72	HPV18	E2	10	343
HPV18	E2	11	72	HPV18	E2	11	244
HPV18	E2	8	75	HPV18	E2	9	213
HPV18	E2	9	75	HPV18	E2	9	298
HPV18	E2	8	280	HPV18	E2	9	203
HPV18	E2	10	280	HPV18	E2	10	203
HPV18	E2	11	280	HPV18	E2	8	32
HPV18	E2	10	257	HPV18	E2	9	32
HPV18	E2	11	257	HPV18	E2	9	206
HPV18	E2	11	152	HPV18	E2	10	206
HPV18	E2	10	92	HPV18	E2	8	230

Table VIII

HLA-A2 Supermotif-Bearing Peptides

HPV18	E2	10	230	HPV18	E5	8	57
HPV18	E2	8	318	HPV18	E5	10	57
HPV18	E2	11	233	HPV18	E5	9	50
HPV18	E2	9	355	HPV18	E5	10	50
HPV18	E2	10	355	HPV18	E5	8	37
HPV18	E2	11	355	HPV18	E5	11	37
HPV18	E2	8	140	HPV18	E5	8	65
HPV18	E2	10	140	HPV18	E5	8	19
HPV18	E2	8	236	HPV18	E5	10	19
HPV18	E2	10	236	HPV18	E5	9	43
HPV18	E2	11	236	HPV18	E5	10	43
HPV18	E2	10	153	HPV18	E5	8	40
HPV18	E2	9	57	HPV18	E5	9	40
HPV18	E2	9	97.	HPV18	E5	10	40
HPV18	E2	9	7	HPV18	E5	9	4
HPV18	E2	10	215	HPV18	E5	11	4
HPV18	E2	9	341	HPV18	E5	8	63
HPV18	E2	10	341	HPV18	E5	10	63
HPV18	E2	11	341	HPV18	E5	8	62
HPV18	E2	8	349	HPV18	E5	9	62
HPV18	E2	10	349	HPV18	E5	11	62
HPV18	E2	11	349	HPV18	E5	9	58
HPV18	E2	8	211	HPV18	E5	11	58
HPV18	E2	11	211	HPV18	E5	9	22
HPV18	E2	9	231	HPV18	E5	11	22
HPV18	E2	8	334	HPV18	E5	8	35
HPV18	E2	11	334	HPV18	E5	9	35
HPV18	E2	9	350	HPV18	E5	10	35
HPV18	E2	10	350	HPV18	E5	8	61
HPV18	E2	11	350	HPV18	E5	9	61
HPV18	E2	9	136	HPV18	E5	10	61
HPV18	E2	10	136	HPV18	E5	9	46
HPV18	E2	8	197	HPV18	E5	8	21
HPV18	E2	11	197	HPV18	E5	10	21
HPV18	E2	8	356	HPV18	E5	9	60
HPV18	E2	9	356	HPV18	E5	10	60
HPV18	E2	10	356	HPV18	E5	11	60
HPV18	E2	10	335	HPV18	E5	10	3
HPV18	E2	9	37	HPV18	E5	8	25
HPV18	E2	10	37	HPV18	E5	10	25
HPV18	E2	9	322	HPV18	E5	11	25
HPV18	E2	11	322	HPV18	E5	11	48
HPV18	E2	10	96	HPV18	E5	8	51
HPV18	E2	11	143	HPV18	E5	9	51
HPV18	E2	10	135	HPV18	E5	11	51
HPV18	E2	11	135	HPV18	E5	8	42
HPV18	E2	8	164	HPV18	E5	10	42
HPV18	E2	11	164	HPV18	E5	11	42
HPV18	E5	8	47	HPV18	E5	8	34
HPV18	E5	8	29	HPV18	E5	9	34
HPV18	E5	10	29	HPV18	E5	10	34
HPV18	E5	8	27	HPV18	E5	11	34
HPV18	E5	9	27	HPV18	E5	8	41
HPV18	E5	10	27	HPV18	E5	9	41
HPV18	E5	8	13	HPV18	E5	11	41
HPV18	E5	10	13	HPV18	E5	8	33
HPV18	E5	11	13	HPV18	E5	9	33
HPV18	E5	10	11	HPV18	E5	10	33
HPV18	E5	9	6	HPV18	E5	11	33
HPV18	E5	11	6	HPV18	E5	8	31

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	E5	10	31	HPV18	E6	9	95
HPV18	E5	11	31	HPV18	E6	9	22
HPV18	E5	9	39	HPV18	E6	10	22
HPV18	E5	10	39	HPV18	E6	8	114
HPV18	E5	11	39	HPV18	E6	8	111
HPV18	E5	8	15	HPV18	E6	11	111
HPV18	E5	9	15	HPV18	E6	8	7
HPV18	E5	9	53	HPV18	E6	11	7
HPV18	E5	10	53	HPV18	E6	8	149
HPV18	E5	11	53	HPV18	E6	10	149
HPV18	E6	8	68	HPV18	E6	11	146
HPV18	E6	11	68	HPV18	E6	11	59
HPV18	E6	8	105	HPV18	E6	8	24
HPV18	E6	11	105	HPV18	E6	10	24
HPV18	E6	8	108	HPV18	E6	10	84
HPV18	E6	11	108	HPV18	E6	11	84
HPV18	E6	8	18	HPV18	E6	8	89
HPV18	E6	11	18	HPV18	E6	10	89
HPV18	E6	8	32	HPV18	E6	8	37
HPV18	E6	10	32	HPV18	E6	11	38
HPV18	E6	11	32	HPV18	E6	10	54
HPV18	E6	11	27	HPV18	E6	11	54
HPV18	E6	8	16	HPV18	E7	8	6
HPV18	E6	10	16	HPV18	E7	10	6
HPV18	E6	10	51	HPV18	E7	8	63
HPV18	E6	9	88	HPV18	E7	10	63
HPV18	E6	11	88	HPV18	E7	8	24
HPV18	E6	9	29	HPV18	E7	8	82
HPV18	E6	10	29	HPV18	E7	10	82
HPV18	E6	11	29	HPV18	E7	8	69
HPV18	E6	9	20	HPV18	E7	10	40
HPV18	E6	11	20	HPV18	E7	8	90
HPV18	E6	9	77	HPV18	E7	8	86
HPV18	E6	9	40	HPV18	E7	9	86
HPV18	E6	10	43	HPV18	E7	9	43
HPV18	E6	8	47	HPV18	E7	8	14
HPV18	E6	9	47	HPV18	E7	10	14
HPV18	E6	8	53	HPV18	E7	9	46
HPV18	E6	11	53	HPV18	E7	11	11
HPV18	E6	10	97	HPV18	E7	8	5
HPV18	E6	10	136	HPV18	E7	9	5
HPV18	E6	8	62	HPV18	E7	11	5
HPV18	E6	11	120	HPV18	E7	8	73
HPV18	E6	8	30	HPV18	E7	11	73
HPV18	E6	9	30	HPV18	E7	8	8
HPV18	E6	10	30	HPV18	E7	10	74
HPV18	E6	9	13	HPV18	E7	10	61
HPV18	E6	11	13	HPV18	E7	11	92
HPV18	E6	10	92	HPV18	E7	11	50
HPV18	E6	11	92	HPV18	E7	9	17
HPV18	E6	9	36	HPV18	E7	10	17
HPV18	E6	11	102	HPV18	E7	9	56
HPV18	E6	9	25	HPV18	E7	10	22
HPV18	E6	9	150	HPV18	E7	10	88
HPV18	E6	8	41	HPV18	E7	8	87
HPV18	E6	9	93	HPV18	E7	11	87
HPV18	E6	10	93	HPV18	E7	8	53
HPV18	E6	11	93	HPV18	E7	9	53
HPV18	E6	8	1	HPV18	E7	10	53
HPV18	E6	8	95	HPV18	E7	8	84

Table VIII

HLA-A2 Supermotif-Bearing Peptides

HPV18	E7	10	84	HPV18	L1	8	167
HPV18	E7	11	84	HPV18	L1	10	167
HPV18	E7	10	71	HPV18	L1	8	155
HPV18	E7	11	79	HPV18	L1	10	155
HPV18	E7	9	7	HPV18	L1	10	280
HPV18	E7	10	93	HPV18	L1	9	317
HPV18	E7	11	60	HPV18	L1	11	317
HPV18	E7	10	12	HPV18	L1	8	436
HPV18	E7	9	75	HPV18	L1	9	436
HPV18	E7	11	75	HPV18	L1	10	436
HPV18	L1	10	195	HPV18	L1	11	436
HPV18	L1	10	225	HPV18	L1	10	49
HPV18	L1	11	225	HPV18	L1	8	438
HPV18	L1	8	487	HPV18	L1	9	438
HPV18	L1	9	487	HPV18	L1	10	438
HPV18	L1	11	487	HPV18	L1	8	482
HPV18	L1	9	63	HPV18	L1	8	391
HPV18	L1	10	63	HPV18	L1	11	391
HPV18	L1	10	268	HPV18	L1	8	267
HPV18	L1	8	377	HPV18	L1	11	267
HPV18	L1	11	419	HPV18	L1	8	535
HPV18	L1	9	196	HPV18	L1	11	177
HPV18	L1	8	552	HPV18	L1	10	342
HPV18	L1	11	552	HPV18	L1	8	171
HPV18	L1	10	222	HPV18	L1	9	233
HPV18	L1	8	406	HPV18	L1	11	326
HPV18	L1	8	218	HPV18	L1	8	383
HPV18	L1	9	218	HPV18	L1	10	383
HPV18	L1	9	310	HPV18	L1	11	383
HPV18	L1	8	2	HPV18	L1	10	165
HPV18	L1	9	2	HPV18	L1	8	467
HPV18	L1	8	490	HPV18	L1	10	467
HPV18	L1	11	286	HPV18	L1	11	467
HPV18	L1	9	441	HPV18	L1	11	194
HPV18	L1	10	441	HPV18	L1	8	97
HPV18	L1	11	350	HPV18	L1	9	97
HPV18	L1	8	512	HPV18	L1	10	97
HPV18	L1	10	512	HPV18	L1	9	38
HPV18	L1	8	433	HPV18	L1	10	38
HPV18	L1	10	433	HPV18	L1	11	38
HPV18	L1	11	433	HPV18	L1	9	13
HPV18	L1	9	260	HPV18	L1	10	428
HPV18	L1	10	260	HPV18	L1	8	40
HPV18	L1	10	522	HPV18	L1	9	40
HPV18	L1	11	522	HPV18	L1	11	40
HPV18	L1	8	189	HPV18	L1	8	39
HPV18	L1	9	189	HPV18	L1	9	39
HPV18	L1	11	263	HPV18	L1	10	39
HPV18	L1	8	276	HPV18	L1	8	46
HPV18	L1	10	276	HPV18	L1	10	46
HPV18	L1	9	148	HPV18	L1	9	460
HPV18	L1	8	396	HPV18	L1	9	47
HPV18	L1	9	396	HPV18	L1	8	219
HPV18	L1	10	396	HPV18	L1	9	9
HPV18	L1	9	330	HPV18	L1	8	32
HPV18	L1	9	478	HPV18	L1	9	32
HPV18	L1	11	478	HPV18	L1	10	32
HPV18	L1	9	448	HPV18	L1	8	488
HPV18	L1	8	203	HPV18	L1	10	488
				HPV18	L1	8	443

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18 L1	11	443		HPV18 L1	8	282
HPV18 L1	8	360		HPV18 L1	8	248
HPV18 L1	9	376		HPV18 L1	9	248
HPV18 L1	10	186		HPV18 L1	8	525
HPV18 L1	11	186		HPV18 L1	10	525
HPV18 L1	9	505		HPV18 L1	9	28
HPV18 L1	9	120		HPV18 L1	10	28
HPV18 L1	8	213		HPV18 L1	8	26
HPV18 L1	11	213		HPV18 L1	9	26
HPV18 L1	9	125		HPV18 L1	11	26
HPV18 L1	8	8		HPV18 L1	10	240
HPV18 L1	10	8		HPV18 L1	8	20
HPV18 L1	8	14		HPV18 L1	10	20
HPV18 L1	11	103		HPV18 L1	9	333
HPV18 L1	8	274		HPV18 L1	11	333
HPV18 L1	10	274		HPV18 L1	10	540
HPV18 L1	9	434		HPV18 L1	8	91
HPV18 L1	10	434		HPV18 L1	8	472
HPV18 L1	11	434		HPV18 L1	8	412
HPV18 L1	9	445		HPV18 L1	9	412
HPV18 L1	11	403		HPV18 L1	9	533
HPV18 L1	10	104		HPV18 L1	10	533
HPV18 L1	8	476		HPV18 L1	8	216
HPV18 L1	11	476		HPV18 L1	10	216
HPV18 L1	11	531		HPV18 L1	11	216
HPV18 L1	8	159		HPV18 L1	8	439
HPV18 L1	10	159		HPV18 L1	9	439
HPV18 L1	8	33		HPV18 L1	11	439
HPV18 L1	9	33		HPV18 L1	11	315
HPV18 L1	10	62		HPV18 L1	9	366
HPV18 L1	11	62		HPV18 L1	9	389
HPV18 L1	8	261		HPV18 L1	10	389
HPV18 L1	9	261		HPV18 L1	10	137
HPV18 L1	11	36		HPV18 L1	11	61
HPV18 L1	8	402		HPV18 L1	11	297
HPV18 L1	8	388		HPV18 L1	10	214
HPV18 L1	10	388		HPV18 L1	8	324
HPV18 L1	11	388		HPV18 L1	9	324
HPV18 L1	9	84		HPV18 L1	9	158
HPV18 L1	11	84		HPV18 L1	11	158
HPV18 L1	9	253		HPV18 L1	9	6
HPV18 L1	10	253		HPV18 L1	10	6
HPV18 L1	10	70		HPV18 L1	9	81
HPV18 L1	11	70		HPV18 L1	10	81
HPV18 L1	10	510		HPV18 L1	9	299
HPV18 L1	9	54		HPV18 L1	9	551
HPV18 L1	10	54		HPV18 L1	10	127
HPV18 L1	11	54		HPV18 L1	9	288
HPV18 L1	9	52		HPV18 L1	11	288
HPV18 L1	11	52		HPV18 L1	11	93
HPV18 L1	10	199		HPV18 L1	10	459
HPV18 L1	9	207		HPV18 L1	9	31
HPV18 L1	11	207		HPV18 L1	10	31
HPV18 L1	11	496		HPV18 L1	11	31
HPV18 L1	10	114		HPV18 L1	9	359
HPV18 L1	8	224		HPV18 L1	10	150
HPV18 L1	11	224		HPV18 L1	11	150
HPV18 L1	9	558		HPV18 L1	9	518
HPV18 L1	8	344		HPV18 L1	9	475
HPV18 L1	8	57		HPV18 L1	9	335

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	L1	11	335	HPV18	L1	10	394
HPV18	L1	11	306	HPV18	L1	11	394
HPV18	L1	8	242	HPV18	L1	8	82
HPV18	L1	10	242	HPV18	L1	9	82
HPV18	L1	10	365	HPV18	L1	11	82
HPV18	L1	10	272	HPV18	L1	8	161
HPV18	L1	8	400	HPV18	L1	9	452
HPV18	L1	10	400	HPV18	L1	10	452
HPV18	L1	10	485	HPV18	L1	9	45
HPV18	L1	11	485	HPV18	L1	11	45
HPV18	L1	8	78	HPV18	L1	9	337
HPV18	L1	9	209	HPV18	L1	8	73
HPV18	L1	11	209	HPV18	L1	10	73
HPV18	L1	8	234	HPV18	L1	11	73
HPV18	L1	8	446	HPV18	L1	8	129
HPV18	L1	11	446	HPV18	L1	10	129
HPV18	L1	10	404	HPV18	L1	11	4
HPV18	L1	9	541	HPV18	L1	11	88
HPV18	L1	8	442	HPV18	L2	9	6
HPV18	L1	9	442	HPV18	L2	10	6
HPV18	L1	9	273	HPV18	L2	8	286
HPV18	L1	11	273	HPV18	L2	9	286
HPV18	L1	10	444	HPV18	L2	10	341
HPV18	L1	10	327	HPV18	L2	9	303
HPV18	L1	9	215	HPV18	L2	11	303
HPV18	L1	11	215	HPV18	L2	10	139
HPV18	L1	9	156	HPV18	L2	9	358
HPV18	L1	11	156	HPV18	L2	10	358
HPV18	L1	11	409	HPV18	L2	9	278
HPV18	L1	8	397	HPV18	L2	10	278
HPV18	L1	9	397	HPV18	L2	11	278
HPV18	L1	11	397	HPV18	L2	8	404
HPV18	L1	11	473	HPV18	L2	10	404
HPV18	L1	10	553	HPV18	L2	9	142
HPV18	L1	9	105	HPV18	L2	11	142
HPV18	L1	11	105	HPV18	L2	8	129
HPV18	L1	8	254	HPV18	L2	9	129
HPV18	L1	9	254	HPV18	L2	11	129
HPV18	L1	11	254	HPV18	L2	10	349
HPV18	L1	8	331	HPV18	L2	11	349
HPV18	L1	11	331	HPV18	L2	10	346
HPV18	L1	9	393	HPV18	L2	11	16
HPV18	L1	11	393	HPV18	L2	8	354
HPV18	L1	9	71	HPV18	L2	9	83
HPV18	L1	10	71	HPV18	L2	10	83
HPV18	L1	9	486	HPV18	L2	11	83
HPV18	L1	10	486	HPV18	L2	8	270
HPV18	L1	11	79	HPV18	L2	10	270
HPV18	L1	8	255	HPV18	L2	11	270
HPV18	L1	10	255	HPV18	L2	8	396
HPV18	L1	8	7	HPV18	L2	11	396
HPV18	L1	9	7	HPV18	L2	9	30
HPV18	L1	11	7	HPV18	L2	10	30
HPV18	L1	8	449	HPV18	L2	11	30
HPV18	L1	10	532	HPV18	L2	8	194
HPV18	L1	11	532	HPV18	L2	8	334
HPV18	L1	11	136	HPV18	L2	9	334
HPV18	L1	10	89	HPV18	L2	8	175
HPV18	L1	10	392	HPV18	L2	10	175
HPV18	L1	8	394	HPV18	L2	8	169

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	L2	9	169	HPV18	L2	8	416
HPV18	L2	8	455	HPV18	L2	10	416
HPV18	L2	9	369	HPV18	L2	10	103
HPV18	L2	10	369	HPV18	L2	11	103
HPV18	L2	11	200	HPV18	L2	8	43
HPV18	L2	9	443	HPV18	L2	10	43
HPV18	L2	9	53	HPV18	L2	10	22
HPV18	L2	8	241	HPV18	L2	11	22
HPV18	L2	9	241	HPV18	L2	8	19
HPV18	L2	10	241	HPV18	L2	8	34
HPV18	L2	11	276	HPV18	L2	11	34
HPV18	L2	9	122	HPV18	L2	11	40
HPV18	L2	10	122	HPV18	L2	8	106
HPV18	L2	11	157	HPV18	L2	9	106
HPV18	L2	8	306	HPV18	L2	8	248
HPV18	L2	10	306	HPV18	L2	8	335
HPV18	L2	9	181	HPV18	L2	9	197
HPV18	L2	8	116	HPV18	L2	8	45
HPV18	L2	10	116	HPV18	L2	10	45
HPV18	L2	10	314	HPV18	L2	9	263
HPV18	L2	9	51	HPV18	L2	8	242
HPV18	L2	11	51	HPV18	L2	9	242
HPV18	L2	8	58	HPV18	L2	8	287
HPV18	L2	9	429	HPV18	L2	9	391
HPV18	L2	10	56	HPV18	L2	11	391
HPV18	L2	8	300	HPV18	L2	10	338
HPV18	L2	8	25	HPV18	L2	9	79
HPV18	L2	11	25	HPV18	L2	8	179
HPV18	L2	10	204	HPV18	L2	11	179
HPV18	L2	9	64	HPV18	L2	8	254
HPV18	L2	11	64	HPV18	L2	9	254
HPV18	L2	10	60	HPV18	L2	10	254
HPV18	L2	8	188	HPV18	L2	11	254
HPV18	L2	10	188	HPV18	L2	8	160
HPV18	L2	9	432	HPV18	L2	9	160
HPV18	L2	8	310	HPV18	L2	11	160
HPV18	L2	8	124	HPV18	L2	9	285
HPV18	L2	10	124	HPV18	L2	10	285
HPV18	L2	8	37	HPV18	L2	9	422
HPV18	L2	9	37	HPV18	L2	11	138
HPV18	L2	8	134	HPV18	L2	10	357
HPV18	L2	10	134	HPV18	L2	11	357
HPV18	L2	11	134	HPV18	L2	9	325
HPV18	L2	8	292	HPV18	L2	11	325
HPV18	L2	8	326	HPV18	L2	9	209
HPV18	L2	10	326	HPV18	L2	10	209
HPV18	L2	10	167	HPV18	L2	9	415
HPV18	L2	11	167	HPV18	L2	11	415
HPV18	L2	8	279	HPV18	L2	8	73
HPV18	L2	9	279	HPV18	L2	9	73
HPV18	L2	10	279	HPV18	L2	10	73
HPV18	L2	9	44	HPV18	L2	8	214
HPV18	L2	11	44	HPV18	L2	9	214
HPV18	L2	9	405	HPV18	L2	10	196
HPV18	L2	8	143	HPV18	L2	8	390
HPV18	L2	10	143	HPV18	L2	10	390
HPV18	L2	8	130	HPV18	L2	11	337
HPV18	L2	10	130	HPV18	L2	10	171
HPV18	L2	11	130	HPV18	L2	10	419
HPV18	L2	11	249	HPV18	L2	8	98

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	L2	9	98	HPV18	L2	9	409
HPV18	L2	10	98	HPV18	L2	8	235
HPV18	L2	11	120	HPV18	L2	9	235
HPV18	L2	8	86	HPV18	L2	10	149
HPV18	L2	11	86	HPV18	L2	8	13
HPV18	L2	11	185	HPV18	L2	11	111
HPV18	L2	11	216	HPV18	L2	9	412
HPV18	L2	9	95	HPV18	L2	10	412
HPV18	L2	10	95	HPV18	L2	9	420
HPV18	L2	11	95	HPV18	L2	11	420
HPV18	L2	8	360	HPV18	L2	11	377
HPV18	L2	11	360	HPV18	L2	8	105
HPV18	L2	10	90	HPV18	L2	9	105
HPV18	L2	8	398	HPV18	L2	10	105
HPV18	L2	9	398	HPV18	L2	8	406
HPV18	L2	10	398	HPV18	L2	11	406
HPV18	L2	11	232	HPV18	L2	10	262
HPV18	L2	8	198	HPV18	L2	8	304
HPV18	L2	9	172	HPV18	L2	10	304
HPV18	L2	11	172	HPV18	L2	9	425
HPV18	L2	10	233	HPV18	L2	8	38
HPV18	L2	11	233	HPV18	L2	11	261
HPV18	L2	8	5	HPV18	L2	8	154
HPV18	L2	10	5	HPV18	L2	8	136
HPV18	L2	11	5	HPV18	L2	9	136
HPV18	L2	10	11	HPV18	L2	8	410
HPV18	L2	10	302	HPV18	L2	11	410
HPV18	L2	8	229	HPV18	L2	9	135
HPV18	L2	9	229	HPV18	L2	10	135
HPV18	L2	8	298	HPV18	L2	10	388
HPV18	L2	10	298	HPV18	L2	11	293
HPV18	L2	8	281	HPV18	L2	10	217
HPV18	L2	10	225	HPV18	L2	8	80
HPV18	L2	11	220	HPV18	L2	9	176
HPV18	L2	8	316	HPV18	L2	11	176
HPV18	L2	11	316	HPV18	L2	10	221
HPV18	L2	11	450	HPV18	L2	8	236
HPV18	L2	8	132	HPV18	L2	8	92
HPV18	L2	9	132	HPV18	L2	9	140
HPV18	L2	10	132	HPV18	L2	11	140
HPV18	L2	8	380	HPV18	L2	9	104
HPV18	L2	9	380	HPV18	L2	10	104
HPV18	L2	10	380	HPV18	L2	11	104
HPV18	L2	8	340	HPV18	L2	9	113
HPV18	L2	11	340	HPV18	L2	11	113
HPV18	L2	8	166	HPV18	L2	11	387
HPV18	L2	11	166	HPV18	L2	11	81
HPV18	L2	8	151	HPV18	L2	9	91
HPV18	L2	11	151	HPV18	L2	8	31
HPV18	L2	11	102	HPV18	L2	9	31
HPV18	L2	9	49	HPV18	L2	10	31
HPV18	L2	11	49	HPV18	L2	11	31
HPV18	L2	9	247	HPV18	L2	10	112
HPV18	L2	10	212	HPV18	L2	8	351
HPV18	L2	11	212	HPV18	L2	9	351
HPV18	L2	10	424	HPV18	L2	11	351
HPV18	L2	8	147	HPV18	L2	8	332
HPV18	L2	9	147	HPV18	L2	10	332
HPV18	L2	9	153	HPV18	L2	11	332
HPV18	L2	8	409	HPV18	L2	11	427

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV18	L2	10	71	HPV31	E1	8	528
HPV18	L2	11	71	HPV31	E1	10	528
HPV18	L2	9	436	HPV31	E1	8	348
HPV18	L2	8	400	HPV31	E1	9	348
HPV18	L2	11	400	HPV31	E1	10	311
HPV31	E1	9	296	HPV31	E1	8	74
HPV31	E1	11	296	HPV31	E1	9	74
HPV31	E1	8	219	HPV31	E1	11	74
HPV31	E1	9	219	HPV31	E1	8	62
HPV31	E1	10	219	HPV31	E1	11	62
HPV31	E1	8	297	HPV31	E1	8	21
HPV31	E1	10	297	HPV31	E1	11	80
HPV31	E1	10	185	HPV31	E1	9	354
HPV31	E1	10	111	HPV31	E1	10	354
HPV31	E1	11	111	HPV31	E1	10	127
HPV31	E1	9	519	HPV31	E1	8	193
HPV31	E1	11	519	HPV31	E1	10	193
HPV31	E1	8	68	HPV31	E1	11	193
HPV31	E1	9	439	HPV31	E1	9	64
HPV31	E1	10	533	HPV31	E1	10	315
HPV31	E1	11	533	HPV31	E1	11	315
HPV31	E1	9	298	HPV31	E1	8	168
HPV31	E1	9	186	HPV31	E1	10	168
HPV31	E1	10	66	HPV31	E1	11	168
HPV31	E1	8	72	HPV31	E1	8	139
HPV31	E1	10	72	HPV31	E1	8	137
HPV31	E1	11	72	HPV31	E1	10	137
HPV31	E1	10	360	HPV31	E1	11	443
HPV31	E1	9	504	HPV31	E1	8	372
HPV31	E1	11	22	HPV31	E1	10	372
HPV31	E1	10	81	HPV31	E1	11	372
HPV31	E1	10	370	HPV31	E1	10	473
HPV31	E1	8	263	HPV31	E1	10	425
HPV31	E1	11	263	HPV31	E1	9	436
HPV31	E1	8	113	HPV31	E1	9	206
HPV31	E1	9	113	HPV31	E1	8	433
HPV31	E1	10	452	HPV31	E1	10	433
HPV31	E1	8	279	HPV31	E1	8	499
HPV31	E1	9	279	HPV31	E1	8	467
HPV31	E1	9	239	HPV31	E1	8	305
HPV31	E1	10	239	HPV31	E1	8	252
HPV31	E1	9	284	HPV31	E1	11	403
HPV31	E1	8	213	HPV31	E1	10	11
HPV31	E1	11	213	HPV31	E1	10	160
HPV31	E1	8	217	HPV31	E1	10	386
HPV31	E1	10	217	HPV31	E1	9	225
HPV31	E1	11	217	HPV31	E1	10	225
HPV31	E1	10	100	HPV31	E1	11	225
HPV31	E1	9	620	HPV31	E1	8	446
HPV31	E1	10	620	HPV31	E1	9	446
HPV31	E1	11	495	HPV31	E1	10	446
HPV31	E1	10	495	HPV31	E1	8	196
HPV31	E1	10	503	HPV31	E1	8	78
HPV31	E1	10	96	HPV31	E1	9	71
HPV31	E1	11	421	HPV31	E1	11	71
HPV31	E1	9	336	HPV31	E1	11	243
HPV31	E1	11	46	HPV31	E1	8	355
HPV31	E1	10	42	HPV31	E1	9	355
HPV31	E1	9	332	HPV31	E1	9	453
HPV31	E1	10	332	HPV31	E1	9	287

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31 E1	10	287	HPV31 E1	11	175
HPV31 E1	11	287	HPV31 E1	11	258
HPV31 E1	10	268	HPV31 E1	8	187
HPV31 E1	11	268	HPV31 E1	11	187
HPV31 E1	8	381	HPV31 E1	8	285
HPV31 E1	10	422	HPV31 E1	11	285
HPV31 E1	11	184	HPV31 E1	10	255
HPV31 E1	11	110	HPV31 E1	8	257
HPV31 E1	11	532	HPV31 E1	8	535
HPV31 E1	8	497	HPV31 E1	9	535
HPV31 E1	9	497	HPV31 E1	10	535
HPV31 E1	10	497	HPV31 E1	11	535
HPV31 E1	8	380	HPV31 E1	10	47
HPV31 E1	9	380	HPV31 E1	9	143
HPV31 E1	10	276	HPV31 E1	10	143
HPV31 E1	11	276	HPV31 E1	11	143
HPV31 E1	9	272	HPV31 E1	10	340
HPV31 E1	11	272	HPV31 E1	11	340
HPV31 E1	8	291	HPV31 E1	11	549
HPV31 E1	9	291	HPV31 E1	8	518
HPV31 E1	10	119	HPV31 E1	10	518
HPV31 E1	9	232	HPV31 E1	8	173
HPV31 E1	8	179	HPV31 E1	9	308
HPV31 E1	9	179	HPV31 E1	8	104
HPV31 E1	10	179	HPV31 E1	9	104
HPV31 E1	11	412	HPV31 E1	11	104
HPV31 E1	8	247	HPV31 E1	8	59
HPV31 E1	9	247	HPV31 E1	10	59
HPV31 E1	10	247	HPV31 E1	11	59
HPV31 E1	11	247	HPV31 E1	9	135
HPV31 E1	8	493	HPV31 E1	10	135
HPV31 E1	9	493	HPV31 E1	9	460
HPV31 E1	8	362	HPV31 E1	11	460
HPV31 E1	10	362	HPV31 E1	9	55
HPV31 E1	8	454	HPV31 E1	11	55
HPV31 E1	10	286	HPV31 E1	9	4
HPV31 E1	11	286	HPV31 E1	9	492
HPV31 E1	11	202	HPV31 E1	10	492
HPV31 E1	9	470	HPV31 E1	8	541
HPV31 E1	10	470	HPV31 E1	10	541
HPV31 E1	8	543	HPV31 E1	9	93
HPV31 E1	9	277	HPV31 E1	8	170
HPV31 E1	10	277	HPV31 E1	9	170
HPV31 E1	11	277	HPV31 E1	11	170
HPV31 E1	8	273	HPV31 E1	10	524
HPV31 E1	10	273	HPV31 E1	11	524
HPV31 E1	9	542	HPV31 E1	9	60
HPV31 E1	11	234	HPV31 E1	10	60
HPV31 E1	9	256	HPV31 E1	10	378
HPV31 E1	9	534	HPV31 E1	11	378
HPV31 E1	10	534	HPV31 E1	9	67
HPV31 E1	11	534	HPV31 E1	8	430
HPV31 E1	9	474	HPV31 E1	10	430
HPV31 E1	8	326	HPV31 E1	11	430
HPV31 E1	9	326	HPV31 E1	9	361
HPV31 E1	9	490	HPV31 E1	11	361
HPV31 E1	11	490	HPV31 E1	8	536
HPV31 E1	10	235	HPV31 E1	9	536
HPV31 E1	10	244	HPV31 E1	10	536
HPV31 E1	11	244	HPV31 E1	8	399

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31 E1	10	142	HPV31 E1	10	177
HPV31 E1	11	142	HPV31 E1	11	177
HPV31 E1	11	339	HPV31 E1	9	325
HPV31 E1	9	429	HPV31 E1	10	325
HPV31 E1	11	429	HPV31 E1	8	349
HPV31 E1	11	141	HPV31 E1	11	254
HPV31 E1	11	323	HPV31 E1	8	144
HPV31 E1	8	145	HPV31 E1	9	144
HPV31 E1	9	145	HPV31 E1	10	144
HPV31 E1	8	83	HPV31 E1	9	82
HPV31 E1	10	176	HPV31 E1	9	341
HPV31 E1	11	176	HPV31 E1	10	341
HPV31 E1	9	394	HPV31 E1	11	223
HPV31 E1	8	267	HPV31 E1	8	343
HPV31 E1	11	267	HPV31 E1	8	319
HPV31 E1	9	398	HPV31 E1	9	405
HPV31 E1	10	303	HPV31 E1	8	489
HPV31 E1	8	595	HPV31 E1	10	489
HPV31 E1	10	438	HPV31 E1	10	481
HPV31 E1	8	526	HPV31 E1	11	359
HPV31 E1	9	526	HPV31 E1	9	511
HPV31 E1	10	526	HPV31 E1	10	511
HPV31 E1	8	246	HPV31 E1	8	558
HPV31 E1	9	246	HPV31 E1	10	558
HPV31 E1	10	246	HPV31 E1	11	515
HPV31 E1	11	246	HPV31 E1	10	428
HPV31 E1	10	469	HPV31 E1	10	19
HPV31 E1	11	469	HPV31 E1	9	89
HPV31 E1	11	377	HPV31 E2	8	277
HPV31 E1	11	294	HPV31 E2	10	277
HPV31 E1	8	211	HPV31 E2	11	277
HPV31 E1	9	211	HPV31 E2	9	278
HPV31 E1	10	211	HPV31 E2	10	278
HPV31 E1	11	616	HPV31 E2	8	72
HPV31 E1	10	295	HPV31 E2	10	72
HPV31 E1	9	120	HPV31 E2	11	72
HPV31 E1	8	65	HPV31 E2	8	338
HPV31 E1	11	65	HPV31 E2	10	338
HPV31 E1	9	269	HPV31 E2	8	229
HPV31 E1	10	269	HPV31 E2	11	229
HPV31 E1	8	233	HPV31 E2	9	69
HPV31 E1	10	152	HPV31 E2	10	69
HPV31 E1	9	387	HPV31 E2	11	69
HPV31 E1	8	333	HPV31 E2	9	61
HPV31 E1	9	333	HPV31 E2	10	61
HPV31 E1	11	151	HPV31 E2	8	291
HPV31 E1	8	505	HPV31 E2	10	239
HPV31 E1	8	226	HPV31 E2	8	286
HPV31 E1	9	226	HPV31 E2	10	286
HPV31 E1	10	226	HPV31 E2	11	286
HPV31 E1	11	324	HPV31 E2	9	228
HPV31 E1	10	324	HPV31 E2	8	140
HPV31 E1	9	218	HPV31 E2	9	140
HPV31 E1	10	218	HPV31 E2	8	109
HPV31 E1	11	218	HPV31 E2	9	109
HPV31 E1	8	227	HPV31 E2	11	109
HPV31 E1	9	227	HPV31 E2	9	330
HPV31 E1	10	23	HPV31 E2	10	330
HPV31 E1	11	84	HPV31 E2	11	330
HPV31 E1	9	177	HPV31 E2	8	280

Table VIII

HLA-A2 Supermotif-Bearing Peptides

HPV31	E2	8	145	HPV31	E2	11	210
HPV31	E2	10	40	HPV31	E2	9	339
HPV31	E2	8	301	HPV31	E2	8	66
HPV31	E2	9	124	HPV31	E2	10	66
HPV31	E2	8	204	HPV31	E2	8	68
HPV31	E2	9	204	HPV31	E2	10	68
HPV31	E2	11	204	HPV31	E2	11	68
HPV31	E2	8	74	HPV31	E2	10	45
HPV31	E2	9	74	HPV31	E2	8	358
HPV31	E2	8	100	HPV31	E2	10	358
HPV31	E2	11	100	HPV31	E2	8	260
HPV31	E2	11	48	HPV31	E2	11	260
HPV31	E2	10	320	HPV31	E2	8	213
HPV31	E2	9	2	HPV31	E2	9	213
HPV31	E2	8	185	HPV31	E2	10	213
HPV31	E2	9	185	HPV31	E2	10	316
HPV31	E2	10	185	HPV31	E2	11	226
HPV31	E2	8	118	HPV31	E2	10	261
HPV31	E2	11	118	HPV31	E2	8	42
HPV31	E2	8	207	HPV31	E2	10	42
HPV31	E2	10	207	HPV31	E2	8	70
HPV31	E2	11	207	HPV31	E2	9	70
HPV31	E2	11	136	HPV31	E2	10	70
HPV31	E2	10	353	HPV31	E2	8	75
HPV31	E2	11	353	HPV31	E2	11	75
HPV31	E2	10	171	HPV31	E2	8	103
HPV31	E2	8	168	HPV31	E2	8	78
HPV31	E2	9	50	HPV31	E2	9	77
HPV31	E2	10	50	HPV31	E2	8	94
HPV31	E2	8	209	HPV31	E2	10	94
HPV31	E2	9	209	HPV31	E2	11	94
HPV31	E2	10	156	HPV31	E2	9	337
HPV31	E2	11	156	HPV31	E2	11	337
HPV31	E2	10	143	HPV31	E2	10	303
HPV31	E2	10	190	HPV31	E2	10	282
HPV31	E2	8	150	HPV31	E2	11	282
HPV31	E2	11	150	HPV31	E2	10	84
HPV31	E2	8	179	HPV31	E2	11	84
HPV31	E2	10	179	HPV31	E2	8	254
HPV31	E2	9	231	HPV31	E2	9	254
HPV31	E2	10	231	HPV31	E2	11	127
HPV31	E2	11	231	HPV31	E2	9	219
HPV31	E2	9	273	HPV31	E2	11	219
HPV31	E2	9	235	HPV31	E2	8	355
HPV31	E2	8	187	HPV31	E2	9	355
HPV31	E2	8	29	HPV31	E2	11	355
HPV31	E2	10	29	HPV31	E2	10	361
HPV31	E2	8	35	HPV31	E2	11	361
HPV31	E2	9	35	HPV31	E2	8	9
HPV31	E2	9	164	HPV31	E2	8	60
HPV31	E2	8	297	HPV31	E2	10	60
HPV31	E2	9	297	HPV31	E2	11	60
HPV31	E2	9	56	HPV31	E2	9	290
HPV31	E2	8	295	HPV31	E2	9	294
HPV31	E2	10	295	HPV31	E2	11	294
HPV31	E2	11	295	HPV31	E2	8	215
HPV31	E2	9	304	HPV31	E2	11	106
HPV31	E2	8	165	HPV31	E2	8	71
HPV31	E2	11	165	HPV31	E2	9	71
HPV31	E2	8	210	HPV31	E2	11	71

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31	E2	9	317	HPV31	E2	11	220
HPV31	E2	10	76	HPV31	E2	10	116
HPV31	E2	9	95	HPV31	E2	8	356
HPV31	E2	10	95	HPV31	E2	10	356
HPV31	E2	11	95	HPV31	E2	9	362
HPV31	E2	9	283	HPV31	E2	10	362
HPV31	E2	10	283	HPV31	E2	11	362
HPV31	E2	11	283	HPV31	E2	8	274
HPV31	E2	8	96	HPV31	E2	11	274
HPV31	E2	9	96	HPV31	E2	8	192
HPV31	E2	10	96	HPV31	E2	9	41
HPV31	E2	9	191	HPV31	E2	11	41
HPV31	E2	10	151	HPV31	E2	10	119
HPV31	E2	9	321	HPV31	E2	11	119
HPV31	E2	11	321	HPV31	E2	10	211
HPV31	E2	8	57	HPV31	E2	11	211
HPV31	E2	11	57	HPV31	E2	8	340
HPV31	E2	11	238	HPV31	E2	11	147
HPV31	E2	8	285	HPV31	E2	10	58
HPV31	E2	9	285	HPV31	E2	11	328
HPV31	E2	11	285	HPV31	E2	8	92
HPV31	E2	10	37	HPV31	E2	10	92
HPV31	E2	9	7	HPV31	E2	11	344
HPV31	E2	10	7	HPV31	E2	9	138
HPV31	E2	8	311	HPV31	E2	10	138
HPV31	E2	9	247	HPV31	E2	11	138
HPV31	E2	9	276	HPV31	E2	9	102
HPV31	E2	11	276	HPV31	E2	9	131
HPV31	E2	9	53	HPV31	E2	11	131
HPV31	E2	10	53	HPV31	E2	11	115
HPV31	E2	8	98	HPV31	E2	8	159
HPV31	E2	10	98	HPV31	E2	11	159
HPV31	E2	9	348	HPV31	E5	8	40
HPV31	E2	10	348	HPV31	E5	9	40
HPV31	E2	11	5	HPV31	E5	10	40
HPV31	E2	9	346	HPV31	E5	10	53
HPV31	E2	11	346	HPV31	E5	9	61
HPV31	E2	8	324	HPV31	E5	11	61
HPV31	E2	9	266	HPV31	E5	8	26
HPV31	E2	10	266	HPV31	E5	9	26
HPV31	E2	8	198	HPV31	E5	11	26
HPV31	E2	11	198	HPV31	E5	8	20
HPV31	E2	9	269	HPV31	E5	9	20
HPV31	E2	10	269	HPV31	E5	10	20
HPV31	E2	11	269	HPV31	E5	9	3
HPV31	E2	8	63	HPV31	E5	10	3
HPV31	E2	10	63	HPV31	E5	11	3
HPV31	E2	11	63	HPV31	E5	8	66
HPV31	E2	8	364	HPV31	E5	9	66
HPV31	E2	9	364	HPV31	E5	11	66
HPV31	E2	8	3	HPV31	E5	8	15
HPV31	E2	10	128	HPV31	E5	9	15
HPV31	E2	9	93	HPV31	E5	11	15
HPV31	E2	11	93	HPV31	E5	9	24
HPV31	E2	11	292	HPV31	E5	10	24
HPV31	E2	9	221	HPV31	E5	11	24
HPV31	E2	10	221	HPV31	E5	10	72
HPV31	E2	9	240	HPV31	E5	11	52
HPV31	E2	8	220	HPV31	E5	10	48
HPV31	E2	10	220	HPV31	E5	8	46

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31	E5	9	46		HPV31	E5	8	33
HPV31	E5	11	11		HPV31	E5	9	33
HPV31	E5	8	45		HPV31	E5	10	33
HPV31	E5	9	45		HPV31	E5	11	33
HPV31	E5	10	45		HPV31	E5	8	64
HPV31	E5	8	16		HPV31	E5	10	64
HPV31	E5	10	16		HPV31	E5	11	64
HPV31	E5	8	22		HPV31	E5	8	50
HPV31	E5	11	22		HPV31	E5	8	39
HPV31	E5	8	44		HPV31	E5	9	39
HPV31	E5	9	44		HPV31	E5	10	39
HPV31	E5	10	44		HPV31	E5	11	39
HPV31	E5	11	44		HPV31	E5	9	68
HPV31	E5	9	43		HPV31	E5	11	68
HPV31	E5	10	43		HPV31	E5	9	63
HPV31	E5	11	43		HPV31	E5	11	63
HPV31	E5	8	42		HPV31	E6	9	18
HPV31	E5	10	42		HPV31	E6	11	18
HPV31	E5	11	42		HPV31	E6	10	136
HPV31	E5	8	27		HPV31	E6	8	103
HPV31	E5	10	27		HPV31	E6	8	66
HPV31	E5	9	32		HPV31	E6	11	63
HPV31	E5	10	32		HPV31	E6	8	30
HPV31	E5	11	32		HPV31	E6	9	30
HPV31	E5	8	1		HPV31	E6	11	30
HPV31	E5	9	1		HPV31	E6	8	98
HPV31	E5	11	1		HPV31	E6	10	49
HPV31	E5	8	5		HPV31	E6	8	57
HPV31	E5	9	5		HPV31	E6	11	57
HPV31	E5	9	70		HPV31	E6	9	20
HPV31	E5	9	56		HPV31	E6	8	14
HPV31	E5	10	56		HPV31	E6	8	39
HPV31	E5	8	31		HPV31	E6	10	39
HPV31	E5	10	31		HPV31	E6	8	41
HPV31	E5	11	31		HPV31	E6	10	41
HPV31	E5	8	10		HPV31	E6	11	41
HPV31	E5	10	7		HPV31	E6	8	45
HPV31	E5	11	7		HPV31	E6	9	45
HPV31	E5	8	35		HPV31	E6	10	95
HPV31	E5	9	35		HPV31	E6	11	95
HPV31	E5	10	35		HPV31	E6	8	35
HPV31	E5	11	35		HPV31	E6	9	35
HPV31	E5	8	37		HPV31	E6	8	85
HPV31	E5	9	37		HPV31	E6	11	118
HPV31	E5	10	37		HPV31	E6	9	137
HPV31	E5	11	37		HPV31	E6	11	137
HPV31	E5	8	41		HPV31	E6	11	52
HPV31	E5	9	41		HPV31	E6	8	11
HPV31	E5	11	41		HPV31	E6	9	11
HPV31	E5	9	8		HPV31	E6	11	11
HPV31	E5	10	8		HPV31	E6	10	90
HPV31	E5	9	73		HPV31	E6	11	90
HPV31	E5	8	47		HPV31	E6	11	100
HPV31	E5	11	47		HPV31	E6	10	37
HPV31	E5	9	28		HPV31	E6	9	50
HPV31	E5	11	28		HPV31	E6	9	91
HPV31	E5	10	12		HPV31	E6	10	91
HPV31	E5	11	12		HPV31	E6	11	91
HPV31	E5	8	21		HPV31	E6	11	127
HPV31	E5	9	21		HPV31	E6	8	5

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31	E6	11	5	HPV31	E7	11	72
HPV31	E6	11	109	HPV31	E7	9	37
HPV31	E6	8	36	HPV31	E7	8	12
HPV31	E6	11	36	HPV31	E7	9	12
HPV31	E6	11	27	HPV31	E7	11	12
HPV31	E6	10	17	HPV31	E7	8	69
HPV31	E6	10	82	HPV31	E7	10	69
HPV31	E6	11	82	HPV31	E7	11	69
HPV31	E6	8	51	HPV31	E7	10	55
HPV31	E6	10	87	HPV31	E7	11	55
HPV31	E6	11	86	HPV31	E7	9	11
HPV31	E6	9	42	HPV31	E7	10	11
HPV31	E6	10	42	HPV31	L1	8	347
HPV31	E6	11	42	HPV31	L1	9	347
HPV31	E7	10	19	HPV31	L1	8	348
HPV31	E7	9	59	HPV31	L1	10	398
HPV31	E7	11	59	HPV31	L1	11	398
HPV31	E7	9	68	HPV31	L1	8	426
HPV31	E7	11	68	HPV31	L1	10	180
HPV31	E7	8	75	HPV31	L1	9	213
HPV31	E7	9	75	HPV31	L1	11	213
HPV31	E7	10	75	HPV31	L1	10	208
HPV31	E7	8	21	HPV31	L1	8	317
HPV31	E7	9	14	HPV31	L1	10	305
HPV31	E7	8	48	HPV31	L1	11	285
HPV31	E7	9	48	HPV31	L1	8	9
HPV31	E7	10	36	HPV31	L1	10	9
HPV31	E7	11	18	HPV31	L1	9	346
HPV31	E7	9	81	HPV31	L1	10	346
HPV31	E7	10	81	HPV31	L1	9	147
HPV31	E7	9	4	HPV31	L1	11	147
HPV31	E7	10	4	HPV31	L1	9	158
HPV31	E7	9	88	HPV31	L1	11	304
HPV31	E7	11	88	HPV31	L1	9	387
HPV31	E7	8	89	HPV31	L1	8	372
HPV31	E7	10	89	HPV31	L1	11	372
HPV31	E7	11	54	HPV31	L1	10	275
HPV31	E7	8	82	HPV31	L1	11	275
HPV31	E7	9	82	HPV31	L1	9	200
HPV31	E7	8	83	HPV31	L1	10	200
HPV31	E7	8	8	HPV31	L1	10	461
HPV31	E7	11	79	HPV31	L1	11	461
HPV31	E7	8	15	HPV31	L1	9	129
HPV31	E7	9	41	HPV31	L1	10	203
HPV31	E7	8	6	HPV31	L1	11	203
HPV31	E7	10	6	HPV31	L1	8	216
HPV31	E7	11	44	HPV31	L1	10	216
HPV31	E7	11	27	HPV31	L1	9	88
HPV31	E7	10	73	HPV31	L1	8	336
HPV31	E7	11	73	HPV31	L1	10	336
HPV31	E7	8	77	HPV31	L1	10	417
HPV31	E7	9	66	HPV31	L1	11	417
HPV31	E7	11	66	HPV31	L1	9	8
HPV31	E7	10	63	HPV31	L1	11	8
HPV31	E7	8	71	HPV31	L1	8	95
HPV31	E7	9	71	HPV31	L1	10	95
HPV31	E7	9	7	HPV31	L1	8	107
HPV31	E7	9	64	HPV31	L1	10	107
HPV31	E7	11	64	HPV31	L1	10	449
HPV31	E7	8	72	HPV31	L1	8	375

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31 L1	9	375		HPV31 L1	10	373
HPV31 L1	10	375		HPV31 L1	11	373
HPV31 L1	9	469		HPV31 L1	8	69
HPV31 L1	8	377		HPV31 L1	10	69
HPV31 L1	10	377		HPV31 L1	9	407
HPV31 L1	11	211		HPV31 L1	10	43
HPV31 L1	11	257		HPV31 L1	8	99
HPV31 L1	8	421		HPV31 L1	10	99
HPV31 L1	8	331		HPV31 L1	11	314
HPV31 L1	11	331		HPV31 L1	10	389
HPV31 L1	8	207		HPV31 L1	11	389
HPV31 L1	11	207		HPV31 L1	9	238
HPV31 L1	8	323		HPV31 L1	10	238
HPV31 L1	10	323		HPV31 L1	8	201
HPV31 L1	11	323		HPV31 L1	9	201
HPV31 L1	8	117		HPV31 L1	8	300
HPV31 L1	10	105		HPV31 L1	11	179
HPV31 L1	9	68		HPV31 L1	9	32
HPV31 L1	11	68		HPV31 L1	11	32
HPV31 L1	10	406		HPV31 L1	8	451
HPV31 L1	8	111		HPV31 L1	10	451
HPV31 L1	8	141		HPV31 L1	8	342
HPV31 L1	10	141		HPV31 L1	9	342
HPV31 L1	9	266		HPV31 L1	8	328
HPV31 L1	11	266		HPV31 L1	10	328
HPV31 L1	9	115		HPV31 L1	11	328
HPV31 L1	10	115		HPV31 L1	10	220
HPV31 L1	8	36		HPV31 L1	11	397
HPV31 L1	9	36		HPV31 L1	8	222
HPV31 L1	10	36		HPV31 L1	8	188
HPV31 L1	9	399		HPV31 L1	9	188
HPV31 L1	10	399		HPV31 L1	8	464
HPV31 L1	11	399		HPV31 L1	10	464
HPV31 L1	8	388		HPV31 L1	11	113
HPV31 L1	11	388		HPV31 L1	9	122
HPV31 L1	9	196		HPV31 L1	8	294
HPV31 L1	8	382		HPV31 L1	9	294
HPV31 L1	9	382		HPV31 L1	8	15
HPV31 L1	11	382		HPV31 L1	10	15
HPV31 L1	9	181		HPV31 L1	8	17
HPV31 L1	11	181		HPV31 L1	8	425
HPV31 L1	9	61		HPV31 L1	9	425
HPV31 L1	10	482		HPV31 L1	9	306
HPV31 L1	8	381		HPV31 L1	9	378
HPV31 L1	9	381		HPV31 L1	11	378
HPV31 L1	10	381		HPV31 L1	11	156
HPV31 L1	10	60		HPV31 L1	9	329
HPV31 L1	10	237		HPV31 L1	10	329
HPV31 L1	11	237		HPV31 L1	9	316
HPV31 L1	8	153		HPV31 L1	8	476
HPV31 L1	9	65		HPV31 L1	9	98
HPV31 L1	9	20		HPV31 L1	11	98
HPV31 L1	10	20		HPV31 L1	8	30
HPV31 L1	9	287		HPV31 L1	11	30
HPV31 L1	8	159		HPV31 L1	8	385
HPV31 L1	8	123		HPV31 L1	11	385
HPV31 L1	8	470		HPV31 L1	9	457
HPV31 L1	11	42		HPV31 L1	8	487
HPV31 L1	8	214		HPV31 L1	9	487
HPV31 L1	10	214		HPV31 L1	11	487

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31	L1	8	490	HPV31	L1	11	21
HPV31	L1	9	228	HPV31	L1	8	101
HPV31	L1	11	228	HPV31	L1	8	391
HPV31	L1	11	51	HPV31	L1	9	391
HPV31	L1	9	414	HPV31	L1	10	391
HPV31	L1	10	414	HPV31	L1	8	277
HPV31	L1	8	2	HPV31	L1	9	277
HPV31	L1	9	2	HPV31	L1	10	277
HPV31	L1	10	2	HPV31	L1	11	277
HPV31	L1	9	149	HPV31	L1	10	12
HPV31	L1	11	149	HPV31	L1	11	12
HPV31	L1	9	299	HPV31	L1	10	364
HPV31	L1	9	424	HPV31	L1	9	250
HPV31	L1	10	424	HPV31	L1	8	445
HPV31	L1	9	283	HPV31	L1	11	27
HPV31	L1	9	23	HPV31	L2	9	24
HPV31	L1	11	23	HPV31	L2	10	24
HPV31	L1	8	340	HPV31	L2	8	143
HPV31	L1	9	340	HPV31	L2	10	143
HPV31	L1	10	340	HPV31	L2	8	281
HPV31	L1	11	340	HPV31	L2	8	286
HPV31	L1	11	492	HPV31	L2	9	286
HPV31	L1	11	290	HPV31	L2	9	367
HPV31	L1	11	344	HPV31	L2	10	367
HPV31	L1	8	194	HPV31	L2	11	367
HPV31	L1	9	194	HPV31	L2	10	15
HPV31	L1	11	194	HPV31	L2	11	15
HPV31	L1	8	271	HPV31	L2	8	226
HPV31	L1	10	212	HPV31	L2	11	226
HPV31	L1	8	284	HPV31	L2	9	135
HPV31	L1	10	286	HPV31	L2	10	135
HPV31	L1	11	246	HPV31	L2	11	135
HPV31	L1	8	383	HPV31	L2	11	342
HPV31	L1	10	383	HPV31	L2	8	376
HPV31	L1	9	96	HPV31	L2	10	376
HPV31	L1	11	96	HPV31	L2	8	382
HPV31	L1	9	494	HPV31	L2	10	382
HPV31	L1	8	408	HPV31	L2	11	382
HPV31	L1	11	408	HPV31	L2	8	133
HPV31	L1	9	337	HPV31	L2	9	133
HPV31	L1	11	337	HPV31	L2	11	133
HPV31	L1	10	493	HPV31	L2	9	278
HPV31	L1	8	267	HPV31	L2	10	278
HPV31	L1	10	267	HPV31	L2	11	278
HPV31	L1	9	44	HPV31	L2	10	400
HPV31	L1	9	333	HPV31	L2	8	322
HPV31	L1	11	333	HPV31	L2	9	354
HPV31	L1	9	10	HPV31	L2	10	354
HPV31	L1	8	239	HPV31	L2	9	43
HPV31	L1	9	239	HPV31	L2	11	43
HPV31	L1	8	195	HPV31	L2	8	358
HPV31	L1	10	195	HPV31	L2	10	358
HPV31	L1	10	28	HPV31	L2	11	358
HPV31	L1	11	422	HPV31	L2	8	364
HPV31	L1	10	332	HPV31	L2	9	139
HPV31	L1	8	334	HPV31	L2	10	139
HPV31	L1	10	334	HPV31	L2	8	116
HPV31	L1	8	62	HPV31	L2	9	31
HPV31	L1	8	21	HPV31	L2	10	31
HPV31	L1	9	21	HPV31	L2	11	31

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31 L2	9	408	HPV31 L2	10	245
HPV31 L2	11	408	HPV31 L2	11	245
HPV31 L2	10	84	HPV31 L2	8	114
HPV31 L2	8	190	HPV31 L2	10	114
HPV31 L2	9	190	HPV31 L2	10	105
HPV31 L2	11	190	HPV31 L2	11	105
HPV31 L2	9	334	HPV31 L2	9	197
HPV31 L2	10	334	HPV31 L2	10	197
HPV31 L2	11	334	HPV31 L2	10	23
HPV31 L2	8	171	HPV31 L2	11	23
HPV31 L2	9	253	HPV31 L2	8	225
HPV31 L2	10	196	HPV31 L2	9	225
HPV31 L2	11	196	HPV31 L2	8	35
HPV31 L2	11	276	HPV31 L2	11	35
HPV31 L2	8	237	HPV31 L2	10	242
HPV31 L2	9	237	HPV31 L2	10	302
HPV31 L2	10	237	HPV31 L2	11	302
HPV31 L2	11	158	HPV31 L2	8	231
HPV31 L2	8	459	HPV31 L2	10	231
HPV31 L2	8	361	HPV31 L2	8	423
HPV31 L2	11	361	HPV31 L2	10	423
HPV31 L2	9	433	HPV31 L2	8	244
HPV31 L2	11	118	HPV31 L2	11	244
HPV31 L2	10	314	HPV31 L2	8	176
HPV31 L2	9	339	HPV31 L2	10	176
HPV31 L2	10	339	HPV31 L2	9	177
HPV31 L2	8	310	HPV31 L2	9	164
HPV31 L2	8	59	HPV31 L2	8	287
HPV31 L2	9	113	HPV31 L2	8	108
HPV31 L2	11	113	HPV31 L2	10	108
HPV31 L2	10	57	HPV31 L2	9	447
HPV31 L2	9	351	HPV31 L2	8	335
HPV31 L2	10	221	HPV31 L2	9	335
HPV31 L2	8	26	HPV31 L2	10	335
HPV31 L2	11	26	HPV31 L2	11	335
HPV31 L2	9	65	HPV31 L2	11	256
HPV31 L2	11	65	HPV31 L2	9	269
HPV31 L2	9	52	HPV31 L2	11	269
HPV31 L2	8	213	HPV31 L2	8	204
HPV31 L2	10	213	HPV31 L2	11	204
HPV31 L2	11	413	HPV31 L2	8	390
HPV31 L2	9	175	HPV31 L2	8	292
HPV31 L2	11	175	HPV31 L2	8	370
HPV31 L2	8	38	HPV31 L2	11	370
HPV31 L2	9	38	HPV31 L2	8	169
HPV31 L2	11	41	HPV31 L2	9	169
HPV31 L2	8	280	HPV31 L2	10	169
HPV31 L2	9	280	HPV31 L2	8	328
HPV31 L2	8	270	HPV31 L2	11	328
HPV31 L2	10	270	HPV31 L2	9	142
HPV31 L2	11	270	HPV31 L2	11	142
HPV31 L2	8	134	HPV31 L2	9	285
HPV31 L2	10	134	HPV31 L2	10	285
HPV31 L2	11	134	HPV31 L2	9	120
HPV31 L2	8	279	HPV31 L2	10	120
HPV31 L2	9	279	HPV31 L2	10	217
HPV31 L2	10	279	HPV31 L2	11	217
HPV31 L2	9	144	HPV31 L2	10	366
HPV31 L2	9	45	HPV31 L2	11	366
HPV31 L2	10	205	HPV31 L2	8	250

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31	L2	9	410	HPV31	L2	10	298
HPV31	L2	8	402	HPV31	L2	9	69
HPV31	L2	10	402	HPV31	L2	8	9
HPV31	L2	9	210	HPV31	L2	10	9
HPV31	L2	11	210	HPV31	L2	8	306
HPV31	L2	8	122	HPV31	L2	10	306
HPV31	L2	8	88	HPV31	L2	8	316
HPV31	L2	11	88	HPV31	L2	11	316
HPV31	L2	9	422	HPV31	L2	9	454
HPV31	L2	11	422	HPV31	L2	11	454
HPV31	L2	9	100	HPV31	L2	8	239
HPV31	L2	10	100	HPV31	L2	8	14
HPV31	L2	8	337	HPV31	L2	11	14
HPV31	L2	9	337	HPV31	L2	8	341
HPV31	L2	11	337	HPV31	L2	9	381
HPV31	L2	8	394	HPV31	L2	11	381
HPV31	L2	10	394	HPV31	L2	8	384
HPV31	L2	8	74	HPV31	L2	9	384
HPV31	L2	9	74	HPV31	L2	10	384
HPV31	L2	9	192	HPV31	L2	8	94
HPV31	L2	10	235	HPV31	L2	9	332
HPV31	L2	11	235	HPV31	L2	11	332
HPV31	L2	8	156	HPV31	L2	11	431
HPV31	L2	9	156	HPV31	L2	9	325
HPV31	L2	8	388	HPV31	L2	11	325
HPV31	L2	10	388	HPV31	L2	8	86
HPV31	L2	10	167	HPV31	L2	10	86
HPV31	L2	11	167	HPV31	L2	10	182
HPV31	L2	9	415	HPV31	L2	11	104
HPV31	L2	10	415	HPV31	L2	8	107
HPV31	L2	8	425	HPV31	L2	9	107
HPV31	L2	10	425	HPV31	L2	11	107
HPV31	L2	8	127	HPV31	L2	11	260
HPV31	L2	9	127	HPV31	L2	9	50
HPV31	L2	10	127	HPV31	L2	11	50
HPV31	L2	11	127	HPV31	L2	9	374
HPV31	L2	9	97	HPV31	L2	10	374
HPV31	L2	10	97	HPV31	L2	8	396
HPV31	L2	10	92	HPV31	L2	9	151
HPV31	L2	8	44	HPV31	L2	8	184
HPV31	L2	10	44	HPV31	L2	10	184
HPV31	L2	9	243	HPV31	L2	8	6
HPV31	L2	8	17	HPV31	L2	10	6
HPV31	L2	9	17	HPV31	L2	11	6
HPV31	L2	11	17	HPV31	L2	10	346
HPV31	L2	9	228	HPV31	L2	8	199
HPV31	L2	11	228	HPV31	L2	11	199
HPV31	L2	8	20	HPV31	L2	11	208
HPV31	L2	9	303	HPV31	L2	10	76
HPV31	L2	10	303	HPV31	L2	9	379
HPV31	L2	11	303	HPV31	L2	11	379
HPV31	L2	8	417	HPV31	L2	8	80
HPV31	L2	10	417	HPV31	L2	10	80
HPV31	L2	11	417	HPV31	L2	9	162
HPV31	L2	8	229	HPV31	L2	11	162
HPV31	L2	10	229	HPV31	L2	9	149
HPV31	L2	10	12	HPV31	L2	11	149
HPV31	L2	8	219	HPV31	L2	8	137
HPV31	L2	9	219	HPV31	L2	9	137
HPV31	L2	8	298	HPV31	L2	11	137

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV31	L2	8	375	HPV33	E1	8	65
HPV31	L2	9	375	HPV33	E1	9	532
HPV31	L2	11	375	HPV33	E1	11	532
HPV31	L2	9	347	HPV33	E1	8	84
HPV31	L2	11	347	HPV33	E1	10	546
HPV31	L2	8	304	HPV33	E1	11	546
HPV31	L2	9	304	HPV33	E1	8	311
HPV31	L2	10	304	HPV33	E1	9	311
HPV31	L2	9	16	HPV33	E1	8	318
HPV31	L2	10	16	HPV33	E1	11	318
HPV31	L2	10	227	HPV33	E1	10	373
HPV31	L2	8	416	HPV33	E1	11	373
HPV31	L2	9	416	HPV33	E1	10	81
HPV31	L2	11	416	HPV33	E1	11	81
HPV31	L2	8	136	HPV33	E1	11	22
HPV31	L2	9	136	HPV33	E1	8	83
HPV31	L2	10	136	HPV33	E1	9	83
HPV31	L2	8	39	HPV33	E1	8	310
HPV31	L2	8	140	HPV33	E1	9	310
HPV31	L2	9	140	HPV33	E1	10	310
HPV31	L2	11	140	HPV33	E1	11	310
HPV31	L2	9	426	HPV33	E1	11	230
HPV31	L2	8	128	HPV33	E1	8	259
HPV31	L2	9	128	HPV33	E1	9	259
HPV31	L2	10	128	HPV33	E1	10	259
HPV31	L2	11	128	HPV33	E1	11	259
HPV31	L2	9	344	HPV33	E1	8	465
HPV31	L2	10	343	HPV33	E1	10	465
HPV31	L2	11	391	HPV33	E1	9	297
HPV31	L2	10	362	HPV33	E1	11	226
HPV31	L2	8	254	HPV33	E1	9	14
HPV31	L2	10	392	HPV33	E1	10	14
HPV31	L2	9	81	HPV33	E1	11	14
HPV31	L2	9	232	HPV33	E1	8	118
HPV31	L2	8	32	HPV33	E1	11	118
HPV31	L2	9	32	HPV33	E1	10	494
HPV31	L2	10	32	HPV33	E1	10	508
HPV31	L2	11	32	HPV33	E1	11	508
HPV31	L2	8	163	HPV33	E1	9	367
HPV31	L2	10	163	HPV33	E1	10	367
HPV31	L2	9	377	HPV33	E1	10	46
HPV31	L2	11	377	HPV33	E1	8	78
HPV31	L2	11	147	HPV33	E1	9	349
HPV31	L2	8	356	HPV33	E1	8	62
HPV31	L2	10	356	HPV33	E1	11	62
HPV31	L2	8	440	HPV33	E1	8	541
HPV31	L2	9	440	HPV33	E1	10	541
HPV31	L2	10	446	HPV33	E1	10	324
HPV31	L2	9	19	HPV33	E1	8	516
HPV31	L2	10	72	HPV33	E1	10	516
HPV31	L2	11	72	HPV33	E1	9	64
HPV31	L2	8	386	HPV33	E1	8	21
HPV31	L2	10	386	HPV33	E1	8	206
HPV33	E1	11	382	HPV33	E1	10	206
HPV33	E1	8	90	HPV33	E1	11	206
HPV33	E1	11	90	HPV33	E1	10	537
HPV33	E1	9	96	HPV33	E1	11	537
HPV33	E1	10	96	HPV33	E1	11	186
HPV33	E1	10	383	HPV33	E1	10	127
HPV33	E1	9	104	HPV33	E1	8	361
				HPV33	E1	9	361

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	E1	11	214	HPV33 E1	11	197
HPV33	E1	11	352	HPV33 E1	8	510
HPV33	E1	8	38	HPV33 E1	9	510
HPV33	E1	10	38	HPV33 E1	11	510
HPV33	E1	11	38	HPV33 E1	8	393
HPV33	E1	11	295	HPV33 E1	9	393
HPV33	E1	10	173	HPV33 E1	9	285
HPV33	E1	11	173	HPV33 E1	8	304
HPV33	E1	9	139	HPV33 E1	9	304
HPV33	E1	10	19	HPV33 E1	8	412
HPV33	E1	8	137	HPV33 E1	9	249
HPV33	E1	11	137	HPV33 E1	11	425
HPV33	E1	8	169	HPV33 E1	9	223
HPV33	E1	8	89	HPV33 E1	10	223
HPV33	E1	9	89	HPV33 E1	9	245
HPV33	E1	10	50	HPV33 E1	11	245
HPV33	E1	9	449	HPV33 E1	8	375
HPV33	E1	10	486	HPV33 E1	9	375
HPV33	E1	11	456	HPV33 E1	10	375
HPV33	E1	8	385	HPV33 E1	8	467
HPV33	E1	10	385	HPV33 E1	9	247
HPV33	E1	11	385	HPV33 E1	11	247
HPV33	E1	10	451	HPV33 E1	9	483
HPV33	E1	8	265	HPV33 E1	10	483
HPV33	E1	10	399	HPV33 E1	11	271
HPV33	E1	8	459	HPV33 E1	9	47
HPV33	E1	9	459	HPV33 E1	9	555
HPV33	E1	10	459	HPV33 E1	11	555
HPV33	E1	8	209	HPV33 E1	10	438
HPV33	E1	10	235	HPV33 E1	11	438
HPV33	E1	10	11	HPV33 E1	9	290
HPV33	E1	9	512	HPV33 E1	10	290
HPV33	E1	8	480	HPV33 E1	11	290
HPV33	E1	11	416	HPV33 E1	8	556
HPV33	E1	8	44	HPV33 E1	10	556
HPV33	E1	9	564	HPV33 E1	8	286
HPV33	E1	10	6	HPV33 E1	11	286
HPV33	E1	10	327	HPV33 E1	10	257
HPV33	E1	11	327	HPV33 E1	11	257
HPV33	E1	8	163	HPV33 E1	8	184
HPV33	E1	11	256	HPV33 E1	9	339
HPV33	E1	8	368	HPV33 E1	9	503
HPV33	E1	9	368	HPV33 E1	11	503
HPV33	E1	8	200	HPV33 E1	8	260
HPV33	E1	11	200	HPV33 E1	9	260
HPV33	E1	9	400	HPV33 E1	10	260
HPV33	E1	8	59	HPV33 E1	11	260
HPV33	E1	10	59	HPV33 E1	8	362
HPV33	E1	11	59	HPV33 E1	9	557
HPV33	E1	8	72	HPV33 E1	10	281
HPV33	E1	10	72	HPV33 E1	11	281
HPV33	E1	11	72	HPV33 E1	9	547
HPV33	E1	8	484	HPV33 E1	10	547
HPV33	E1	9	484	HPV33 E1	11	547
HPV33	E1	8	419	HPV33 E1	10	215
HPV33	E1	10	231	HPV33 E1	10	1
HPV33	E1	11	231	HPV33 E1	8	513
HPV33	E1	8	394	HPV33 E1	11	513
HPV33	E1	10	435	HPV33 E1	9	466
HPV33	E1	9	407	HPV33 E1	8	298

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	E1	10	353	HPV33	E1	8	280
HPV33	E1	11	353	HPV33	E1	11	280
HPV33	E1	11	562	HPV33	E1	10	316
HPV33	E1	8	531	HPV33	E1	11	109
HPV33	E1	10	531	HPV33	E1	8	608
HPV33	E1	11	80	HPV33	E1	9	608
HPV33	E1	8	443	HPV33	E1	10	95
HPV33	E1	10	443	HPV33	E1	11	95
HPV33	E1	8	346	HPV33	E1	9	634
HPV33	E1	9	346	HPV33	E1	8	539
HPV33	E1	9	199	HPV33	E1	9	539
HPV33	E1	9	71	HPV33	E1	10	539
HPV33	E1	11	71	HPV33	E1	9	111
HPV33	E1	8	321	HPV33	E1	8	292
HPV33	E1	9	321	HPV33	E1	9	292
HPV33	E1	9	31	HPV33	E1	8	58
HPV33	E1	10	31	HPV33	E1	9	58
HPV33	E1	9	627	HPV33	E1	11	58
HPV33	E1	8	289	HPV33	E1	10	482
HPV33	E1	10	289	HPV33	E1	11	482
HPV33	E1	11	289	HPV33	E1	11	243
HPV33	E1	10	155	HPV33	E1	9	252
HPV33	E1	9	135	HPV33	E1	10	252
HPV33	E1	10	135	HPV33	E1	8	54
HPV33	E1	9	473	HPV33	E1	10	54
HPV33	E1	11	473	HPV33	E1	11	390
HPV33	E1	8	175	HPV33	E1	8	149
HPV33	E1	9	175	HPV33	E1	11	149
HPV33	E1	10	175	HPV33	E1	8	93
HPV33	E1	8	189	HPV33	E1	9	93
HPV33	E1	10	189	HPV33	E1	11	307
HPV33	E1	10	181	HPV33	E1	11	629
HPV33	E1	11	181	HPV33	E1	8	239
HPV33	E1	11	471	HPV33	E1	9	239
HPV33	E1	11	519	HPV33	E1	10	239
HPV33	E1	11	434	HPV33	E1	9	39
HPV33	E1	8	554	HPV33	E1	10	39
HPV33	E1	10	554	HPV33	E1	11	447
HPV33	E1	9	505	HPV33	E1	9	317
HPV33	E1	10	505	HPV33	E1	8	183
HPV33	E1	9	60	HPV33	E1	9	183
HPV33	E1	10	60	HPV33	E1	8	140
HPV33	E1	10	391	HPV33	E1	9	328
HPV33	E1	11	391	HPV33	E1	10	328
HPV33	E1	9	374	HPV33	E1	11	328
HPV33	E1	10	374	HPV33	E1	9	282
HPV33	E1	11	374	HPV33	E1	10	282
HPV33	E1	8	549	HPV33	E1	11	337
HPV33	E1	9	549	HPV33	E1	8	240
HPV33	E1	10	549	HPV33	E1	9	240
HPV33	E1	8	437	HPV33	E1	8	283
HPV33	E1	11	437	HPV33	E1	9	283
HPV33	E1	10	145	HPV33	E1	11	283
HPV33	E1	10	308	HPV33	E1	11	299
HPV33	E1	11	308	HPV33	E1	10	23
HPV33	E1	9	146	HPV33	E1	9	190
HPV33	E1	11	146	HPV33	E1	11	190
HPV33	E1	8	103	HPV33	E1	8	246
HPV33	E1	10	103	HPV33	E1	10	246
HPV33	E1	11	545	HPV33	E1	10	338

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	E1	9	325		HPV33	E2	9	136
HPV33	E1	8	548		HPV33	E2	11	136
HPV33	E1	9	548		HPV33	E2	8	74
HPV33	E1	10	548		HPV33	E2	9	74
HPV33	E1	11	548		HPV33	E2	9	298
HPV33	E1	9	436		HPV33	E2	8	328
HPV33	E1	11	144		HPV33	E2	10	328
HPV33	E1	9	354		HPV33	E2	11	328
HPV33	E1	10	354		HPV33	E2	10	80
HPV33	E1	9	182		HPV33	E2	8	185
HPV33	E1	10	182		HPV33	E2	9	185
HPV33	E1	9	517		HPV33	E2	10	185
HPV33	E1	11	100		HPV33	E2	10	334
HPV33	E1	8	356		HPV33	E2	11	334
HPV33	E1	8	332		HPV33	E2	8	70
HPV33	E1	9	418		HPV33	E2	9	70
HPV33	E1	8	502		HPV33	E2	10	70
HPV33	E1	10	502		HPV33	E2	9	325
HPV33	E1	8	522		HPV33	E2	11	325
HPV33	E1	11	522		HPV33	E2	8	319
HPV33	E1	11	372		HPV33	E2	9	319
HPV33	E1	9	524		HPV33	E2	11	156
HPV33	E1	10	524		HPV33	E2	8	190
HPV33	E1	8	571		HPV33	E2	10	190
HPV33	E1	11	528		HPV33	E2	8	336
HPV33	E1	8	441		HPV33	E2	9	336
HPV33	E1	10	441		HPV33	E2	11	336
HPV33	E1	8	254		HPV33	E2	10	53
HPV33	E2	9	223		HPV33	E2	11	53
HPV33	E2	11	223		HPV33	E2	9	278
HPV33	E2	8	224		HPV33	E2	8	56
HPV33	E2	10	224		HPV33	E2	9	56
HPV33	E2	11	224		HPV33	E2	8	187
HPV33	E2	9	175		HPV33	E2	11	187
HPV33	E2	9	249		HPV33	E2	8	139
HPV33	E2	10	249		HPV33	E2	9	139
HPV33	E2	11	249		HPV33	E2	10	139
HPV33	E2	9	41		HPV33	E2	11	139
HPV33	E2	10	237		HPV33	E2	10	15
HPV33	E2	10	258		HPV33	E2	11	276
HPV33	E2	11	258		HPV33	E2	8	320
HPV33	E2	9	10		HPV33	E2	8	68
HPV33	E2	10	245		HPV33	E2	10	68
HPV33	E2	11	245		HPV33	E2	11	68
HPV33	E2	10	40		HPV33	E2	8	14
HPV33	E2	8	145		HPV33	E2	11	14
HPV33	E2	11	145		HPV33	E2	8	339
HPV33	E2	8	261		HPV33	E2	10	339
HPV33	E2	8	174		HPV33	E2	8	242
HPV33	E2	10	174		HPV33	E2	9	242
HPV33	E2	11	25		HPV33	E2	8	34
HPV33	E2	8	17		HPV33	E2	9	34
HPV33	E2	10	17		HPV33	E2	10	34
HPV33	E2	9	235		HPV33	E2	8	112
HPV33	E2	10	143		HPV33	E2	8	47
HPV33	E2	9	232		HPV33	E2	10	264
HPV33	E2	10	232		HPV33	E2	11	264
HPV33	E2	11	20		HPV33	E2	8	23
HPV33	E2	8	3		HPV33	E2	8	66
HPV33	E2	9	3		HPV33	E2	10	66

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	E2	9	180		HPV33	E2	9	191
HPV33	E2	10	151		HPV33	E2	8	57
HPV33	E2	11	165		HPV33	E2	11	57
HPV33	E2	10	63		HPV33	E2	8	292
HPV33	E2	11	63		HPV33	E2	9	7
HPV33	E2	8	35		HPV33	E2	10	7
HPV33	E2	9	35		HPV33	E2	9	37
HPV33	E2	11	35		HPV33	E2	10	37
HPV33	E2	8	62		HPV33	E2	10	253
HPV33	E2	11	62		HPV33	E2	8	266
HPV33	E2	8	42		HPV33	E2	9	266
HPV33	E2	8	75		HPV33	E2	11	266
HPV33	E2	8	94		HPV33	E2	11	5
HPV33	E2	10	94		HPV33	E2	9	198
HPV33	E2	11	240		HPV33	E2	10	198
HPV33	E2	9	147		HPV33	E2	9	285
HPV33	E2	11	147		HPV33	E2	9	61
HPV33	E2	8	9		HPV33	E2	9	302
HPV33	E2	10	9		HPV33	E2	8	28
HPV33	E2	8	202		HPV33	E2	9	28
HPV33	E2	9	202		HPV33	E2	11	28
HPV33	E2	11	202		HPV33	E2	8	90
HPV33	E2	11	127		HPV33	E2	10	90
HPV33	E2	8	272		HPV33	E2	9	85
HPV33	E2	8	230		HPV33	E2	10	85
HPV33	E2	11	230		HPV33	E2	10	88
HPV33	E2	8	248		HPV33	E2	8	205
HPV33	E2	10	248		HPV33	E2	10	205
HPV33	E2	11	248		HPV33	E2	10	45
HPV33	E2	8	239		HPV33	E2	8	236
HPV33	E2	11	239		HPV33	E2	11	236
HPV33	E2	11	221		HPV33	E2	9	254
HPV33	E2	9	196		HPV33	E2	11	257
HPV33	E2	11	196		HPV33	E2	9	93
HPV33	E2	10	342		HPV33	E2	11	93
HPV33	E2	11	342		HPV33	E2	9	81
HPV33	E2	10	222		HPV33	E2	10	128
HPV33	E2	8	29		HPV33	E2	10	146
HPV33	E2	10	29		HPV33	E2	8	181
HPV33	E2	8	345		HPV33	E2	8	233
HPV33	E2	9	345		HPV33	E2	9	233
HPV33	E2	8	203		HPV33	E2	11	233
HPV33	E2	10	203		HPV33	E2	9	206
HPV33	E2	9	332		HPV33	E2	8	267
HPV33	E2	11	48		HPV33	E2	10	267
HPV33	E2	11	182		HPV33	E2	11	267
HPV33	E2	8	331		HPV33	E2	8	337
HPV33	E2	10	331		HPV33	E2	10	337
HPV33	E2	8	330		HPV33	E2	9	343
HPV33	E2	9	330		HPV33	E2	10	343
HPV33	E2	11	330		HPV33	E2	11	343
HPV33	E2	9	329		HPV33	E2	11	118
HPV33	E2	10	329		HPV33	E2	8	72
HPV33	E2	9	95		HPV33	E2	10	72
HPV33	E2	11	213		HPV33	E2	11	72
HPV33	E2	8	96		HPV33	E2	8	192
HPV33	E2	8	71		HPV33	E2	8	11
HPV33	E2	9	71		HPV33	E2	11	11
HPV33	E2	11	71		HPV33	E2	8	344
					HPV33	E2	9	344

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	E2	10	344	HPV33	E5	11	1
HPV33	E2	10	119	HPV33	E5	8	61
HPV33	E2	11	119	HPV33	E5	11	61
HPV33	E2	8	326	HPV33	E5	8	21
HPV33	E2	10	326	HPV33	E5	10	21
HPV33	E2	11	323	HPV33	E5	9	46
HPV33	E2	8	148	HPV33	E5	10	46
HPV33	E2	10	148	HPV33	E5	9	60
HPV33	E2	10	58	HPV33	E5	8	25
HPV33	E2	8	92	HPV33	E5	9	25
HPV33	E2	10	92	HPV33	E5	10	25
HPV33	E2	8	159	HPV33	E5	11	25
HPV33	E2	9	138	HPV33	E5	8	16
HPV33	E2	10	138	HPV33	E5	9	16
HPV33	E2	11	138	HPV33	E5	11	16
HPV33	E2	11	44	HPV33	E5	8	27
HPV33	E2	9	131	HPV33	E5	9	27
HPV33	E2	10	131	HPV33	E5	10	27
HPV33	E5	9	63	HPV33	E5	11	27
HPV33	E5	10	63	HPV33	E5	8	6
HPV33	E5	9	14	HPV33	E5	10	6
HPV33	E5	10	14	HPV33	E5	8	36
HPV33	E5	11	14	HPV33	E5	8	34
HPV33	E5	9	9	HPV33	E5	10	34
HPV33	E5	10	9	HPV33	E5	8	31
HPV33	E5	11	9	HPV33	E5	9	31
HPV33	E5	8	12	HPV33	E5	11	31
HPV33	E5	11	12	HPV33	E5	8	40
HPV33	E5	9	56	HPV33	E5	10	40
HPV33	E5	8	3	HPV33	E5	8	29
HPV33	E5	9	3	HPV33	E5	9	29
HPV33	E5	11	3	HPV33	E5	10	29
HPV33	E5	8	42	HPV33	E5	11	29
HPV33	E5	9	5	HPV33	E5	9	53
HPV33	E5	11	5	HPV33	E5	10	53
HPV33	E5	8	10	HPV33	E5	11	58
HPV33	E5	9	10	HPV33	E6	11	137
HPV33	E5	10	10	HPV33	E6	9	18
HPV33	E5	8	23	HPV33	E6	11	18
HPV33	E5	10	23	HPV33	E6	8	103
HPV33	E5	11	23	HPV33	E6	8	66
HPV33	E5	8	48	HPV33	E6	8	16
HPV33	E5	10	48	HPV33	E6	11	16
HPV33	E5	9	22	HPV33	E6	8	30
HPV33	E5	11	22	HPV33	E6	8	14
HPV33	E5	8	54	HPV33	E6	9	14
HPV33	E5	9	54	HPV33	E6	10	14
HPV33	E5	11	54	HPV33	E6	9	120
HPV33	E5	8	17	HPV33	E6	8	4
HPV33	E5	10	17	HPV33	E6	9	4
HPV33	E5	11	37	HPV33	E6	8	98
HPV33	E5	9	18	HPV33	E6	11	27
HPV33	E5	11	18	HPV33	E6	8	89
HPV33	E5	8	32	HPV33	E6	11	89
HPV33	E5	10	32	HPV33	E6	9	20
HPV33	E5	10	38	HPV33	E6	8	41
HPV33	E5	9	35	HPV33	E6	10	41
HPV33	E5	9	33	HPV33	E6	11	41
HPV33	E5	11	33	HPV33	E6	8	45
HPV33	E5	10	1	HPV33	E6	9	45

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	E6	10	2		HPV33	E7	8	88
HPV33	E6	11	2		HPV33	E7	8	62
HPV33	E6	10	61		HPV33	E7	11	62
HPV33	E6	11	118		HPV33	E7	8	47
HPV33	E6	10	64		HPV33	E7	9	47
HPV33	E6	11	100		HPV33	E7	10	47
HPV33	E6	10	28		HPV33	E7	10	19
HPV33	E6	10	37		HPV33	E7	8	6
HPV33	E6	11	127		HPV33	E7	10	6
HPV33	E6	11	86		HPV33	E7	11	44
HPV33	E6	11	109		HPV33	E7	9	81
HPV33	E6	10	95		HPV33	E7	10	81
HPV33	E6	11	95		HPV33	E7	8	80
HPV33	E6	11	36		HPV33	E7	10	80
HPV33	E6	8	112		HPV33	E7	11	80
HPV33	E6	10	112		HPV33	E7	8	66
HPV33	E6	10	17		HPV33	E7	11	66
HPV33	E6	10	90		HPV33	E7	8	77
HPV33	E6	11	90		HPV33	E7	10	77
HPV33	E6	9	10		HPV33	E7	11	77
HPV33	E6	10	10		HPV33	E7	8	71
HPV33	E6	10	82		HPV33	E7	9	71
HPV33	E6	11	82		HPV33	E7	8	49
HPV33	E6	10	22		HPV33	E7	8	72
HPV33	E6	10	87		HPV33	E7	11	72
HPV33	E6	8	11		HPV33	E7	9	78
HPV33	E6	9	11		HPV33	E7	10	78
HPV33	E6	11	11		HPV33	E7	9	7
HPV33	E6	8	21		HPV33	E7	10	63
HPV33	E6	11	21		HPV33	E7	11	63
HPV33	E6	9	91		HPV33	E7	8	86
HPV33	E6	10	91		HPV33	E7	10	86
HPV33	E6	11	91		HPV33	E7	9	64
HPV33	E6	11	52		HPV33	E7	10	64
HPV33	E7	10	45		HPV33	E7	9	12
HPV33	E7	11	45		HPV33	E7	11	12
HPV33	E7	8	48		HPV33	E7	9	55
HPV33	E7	9	48		HPV33	E7	10	55
HPV33	E7	9	68		HPV33	E7	11	55
HPV33	E7	11	68		HPV33	E7	8	53
HPV33	E7	8	75		HPV33	E7	11	53
HPV33	E7	9	75		HPV33	E7	10	11
HPV33	E7	10	75		HPV33	L1	10	179
HPV33	E7	8	21		HPV33	L1	8	482
HPV33	E7	9	14		HPV33	L1	11	482
HPV33	E7	9	37		HPV33	L1	8	424
HPV33	E7	8	43		HPV33	L1	8	316
HPV33	E7	9	85		HPV33	L1	8	9
HPV33	E7	11	85		HPV33	L1	10	9
HPV33	E7	9	59		HPV33	L1	9	44
HPV33	E7	11	59		HPV33	L1	8	270
HPV33	E7	8	79		HPV33	L1	9	158
HPV33	E7	9	79		HPV33	L1	9	147
HPV33	E7	11	79		HPV33	L1	11	147
HPV33	E7	10	54		HPV33	L1	9	207
HPV33	E7	11	54		HPV33	L1	9	345
HPV33	E7	8	82		HPV33	L1	10	396
HPV33	E7	9	82		HPV33	L1	11	396
HPV33	E7	8	83		HPV33	L1	8	449
HPV33	E7	11	83		HPV33	L1	10	449

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	L1	8	370	HPV33	L1	10	115
HPV33	L1	11	370	HPV33	L1	8	391
HPV33	L1	9	274	HPV33	L1	10	365
HPV33	L1	10	274	HPV33	L1	8	194
HPV33	L1	11	274	HPV33	L1	10	194
HPV33	L1	10	199	HPV33	L1	9	397
HPV33	L1	10	459	HPV33	L1	10	397
HPV33	L1	11	459	HPV33	L1	9	286
HPV33	L1	11	202	HPV33	L1	9	474
HPV33	L1	8	95	HPV33	L1	10	474
HPV33	L1	10	95	HPV33	L1	8	478
HPV33	L1	9	88	HPV33	L1	10	478
HPV33	L1	8	335	HPV33	L1	10	60
HPV33	L1	9	335	HPV33	L1	11	236
HPV33	L1	10	335	HPV33	L1	8	153
HPV33	L1	10	415	HPV33	L1	10	211
HPV33	L1	11	415	HPV33	L1	9	65
HPV33	L1	10	219	HPV33	L1	8	379
HPV33	L1	9	8	HPV33	L1	9	379
HPV33	L1	11	8	HPV33	L1	10	379
HPV33	L1	9	269	HPV33	L1	9	20
HPV33	L1	8	107	HPV33	L1	10	43
HPV33	L1	10	107	HPV33	L1	11	190
HPV33	L1	10	447	HPV33	L1	11	42
HPV33	L1	8	385	HPV33	L1	8	159
HPV33	L1	9	385	HPV33	L1	8	123
HPV33	L1	9	467	HPV33	L1	10	123
HPV33	L1	9	249	HPV33	L1	8	468
HPV33	L1	8	375	HPV33	L1	9	61
HPV33	L1	9	375	HPV33	L1	11	469
HPV33	L1	10	375	HPV33	L1	8	213
HPV33	L1	8	373	HPV33	L1	10	213
HPV33	L1	9	373	HPV33	L1	8	413
HPV33	L1	10	373	HPV33	L1	9	413
HPV33	L1	11	373	HPV33	L1	10	371
HPV33	L1	9	256	HPV33	L1	11	371
HPV33	L1	11	256	HPV33	L1	11	313
HPV33	L1	8	419	HPV33	L1	8	69
HPV33	L1	8	330	HPV33	L1	10	69
HPV33	L1	11	330	HPV33	L1	9	382
HPV33	L1	8	141	HPV33	L1	11	382
HPV33	L1	10	141	HPV33	L1	9	405
HPV33	L1	8	322	HPV33	L1	8	62
HPV33	L1	10	322	HPV33	L1	8	99
HPV33	L1	11	322	HPV33	L1	10	99
HPV33	L1	8	117	HPV33	L1	8	342
HPV33	L1	10	105	HPV33	L1	10	237
HPV33	L1	8	472	HPV33	L1	11	387
HPV33	L1	11	472	HPV33	L1	9	200
HPV33	L1	9	68	HPV33	L1	8	299
HPV33	L1	11	68	HPV33	L1	11	178
HPV33	L1	8	404	HPV33	L1	10	57
HPV33	L1	10	404	HPV33	L1	8	341
HPV33	L1	11	138	HPV33	L1	9	341
HPV33	L1	8	111	HPV33	L1	8	327
HPV33	L1	11	265	HPV33	L1	10	327
HPV33	L1	10	281	HPV33	L1	11	327
HPV33	L1	8	173	HPV33	L1	9	192
HPV33	L1	10	173	HPV33	L1	10	192
HPV33	L1	9	115	HPV33	L1	8	181

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	L1	10	181	HPV33	L1	9	23
HPV33	L1	11	181	HPV33	L1	11	23
HPV33	L1	8	221	HPV33	L1	8	339
HPV33	L1	8	187	HPV33	L1	10	339
HPV33	L1	9	187	HPV33	L1	11	339
HPV33	L1	10	439	HPV33	L1	8	2
HPV33	L1	8	462	HPV33	L1	9	2
HPV33	L1	10	462	HPV33	L1	10	2
HPV33	L1	11	113	HPV33	L1	8	383
HPV33	L1	9	122	HPV33	L1	10	383
HPV33	L1	11	122	HPV33	L1	11	383
HPV33	L1	10	165	HPV33	L1	8	283
HPV33	L1	11	165	HPV33	L1	8	193
HPV33	L1	8	55	HPV33	L1	9	193
HPV33	L1	9	55	HPV33	L1	11	193
HPV33	L1	8	293	HPV33	L1	11	343
HPV33	L1	9	293	HPV33	L1	10	266
HPV33	L1	9	484	HPV33	L1	9	212
HPV33	L1	8	15	HPV33	L1	11	212
HPV33	L1	10	15	HPV33	L1	8	381
HPV33	L1	8	17	HPV33	L1	10	381
HPV33	L1	10	470	HPV33	L1	9	96
HPV33	L1	8	423	HPV33	L1	11	96
HPV33	L1	9	423	HPV33	L1	8	346
HPV33	L1	9	214	HPV33	L1	9	282
HPV33	L1	11	214	HPV33	L1	8	336
HPV33	L1	8	376	HPV33	L1	9	336
HPV33	L1	9	376	HPV33	L1	11	336
HPV33·	L1	11	376	HPV33	L1	11	430
HPV33	L1	11	156	HPV33	L1	9	332
HPV33	L1	9	305	HPV33	L1	11	332
HPV33	L1	11	254	HPV33	L1	9	10
HPV33	L1	9	328	HPV33	L1	9	174
HPV33	L1	10	328	HPV33	L1	8	386
HPV33	L1	9	481	HPV33	L1	8	380
HPV33	L1	8	263	HPV33	L1	9	380
HPV33	L1	9	263	HPV33	L1	11	380
HPV33	L1	9	315	HPV33	L1	11	420
HPV33	L1	9	98	HPV33	L1	10	331
HPV33	L1	11	98	HPV33	L1	8	333
HPV33	L1	8	30	HPV33	L1	10	333
HPV33	L1	10	488	HPV33	L1	11	333
HPV33	L1	9	455	HPV33	L1	8	21
HPV33	L1	11	289	HPV33	L1	11	21
HPV33	L1	11	410	HPV33	L1	8	101
HPV33	L1	8	51	HPV33	L1	11	401
HPV33	L1	11	51	HPV33	L1	8	36
HPV33	L1	10	285	HPV33	L1	9	36
HPV33	L1	11	32	HPV33	L1	10	36
HPV33	L1	11	245	HPV33	L1	9	389
HPV33	L1	9	412	HPV33	L1	10	389
HPV33	L1	10	412	HPV33	L1	8	276
HPV33	L1	9	149	HPV33	L1	9	276
HPV33	L1	11	149	HPV33	L1	11	276
HPV33	L1	9	298	HPV33	L1	10	362
HPV33	L1	9	422	HPV33	L1	10	12
HPV33	L1	10	422	HPV33	L1	11	12
HPV33	L1	10	304	HPV33	L1	8	443
HPV33	L1	9	227	HPV33	L1	11	27
HPV33	L1	11	227	HPV33	L2	8	81·

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	L2	8	140		HPV33	L2	11	201
HPV33	L2	11	82		HPV33	L2	9	117
HPV33	L2	8	291		HPV33	L2	10	319
HPV33	L2	9	291		HPV33	L2	10	361
HPV33	L2	8	286		HPV33	L2	10	226
HPV33	L2	9	23		HPV33	L2	8	305
HPV33	L2	10	23		HPV33	L2	8	25
HPV33	L2	11	308		HPV33	L2	11	25
HPV33	L2	10	14		HPV33	L2	8	75
HPV33	L2	11	14		HPV33	L2	9	75
HPV33	L2	8	385		HPV33	L2	11	75
HPV33	L2	10	385		HPV33	L2	10	60
HPV33	L2	9	283		HPV33	L2	9	51
HPV33	L2	10	283		HPV33	L2	11	51
HPV33	L2	11	283		HPV33	L2	11	158
HPV33	L2	9	409		HPV33	L2	10	374
HPV33	L2	11	272		HPV33	L2	10	336
HPV33	L2	8	327		HPV33	L2	8	297
HPV33	L2	11	327		HPV33	L2	11	40
HPV33	L2	9	42		HPV33	L2	8	285
HPV33	L2	11	42		HPV33	L2	9	285
HPV33	L2	8	431		HPV33	L2	8	284
HPV33	L2	11	431		HPV33	L2	9	284
HPV33	L2	10	264		HPV33	L2	10	284
HPV33	L2	10	401		HPV33	L2	9	44
HPV33	L2	9	350		HPV33	L2	8	152
HPV33	L2	9	136		HPV33	L2	11	152
HPV33	L2	10	95		HPV33	L2	8	292
HPV33	L2	11	95		HPV33	L2	8	331
HPV33	L2	9	369		HPV33	L2	8	104
HPV33	L2	10	30		HPV33	L2	11	104
HPV33	L2	11	30		HPV33	L2	9	433
HPV33	L2	8	130		HPV33	L2	10	433
HPV33	L2	9	130		HPV33	L2	10	22
HPV33	L2	11	130		HPV33	L2	11	22
HPV33	L2	10	364		HPV33	L2	9	248
HPV33	L2	9	115		HPV33	L2	8	311
HPV33	L2	11	115		HPV33	L2	10	311
HPV33	L2	8	344		HPV33	L2	8	34
HPV33	L2	10	344		HPV33	L2	11	34
HPV33	L2	8	341		HPV33	L2	8	236
HPV33	L2	11	341		HPV33	L2	9	236
HPV33	L2	9	110		HPV33	L2	8	107
HPV33	L2	11	110		HPV33	L2	10	107
HPV33	L2	9	384		HPV33	L2	8	249
HPV33	L2	11	384		HPV33	L2	8	266
HPV33	L2	8	113		HPV33	L2	11	266
HPV33	L2	11	113		HPV33	L2	8	85
HPV33	L2	8	181		HPV33	L2	9	85
HPV33	L2	10	181		HPV33	L2	10	85
HPV33	L2	11	281		HPV33	L2	9	345
HPV33	L2	8	242		HPV33	L2	8	243
HPV33	L2	9	242		HPV33	L2	9	243
HPV33	L2	10	242		HPV33	L2	9	377
HPV33	L2	9	268		HPV33	L2	10	377
HPV33	L2	8	460		HPV33	L2	11	377
HPV33	L2	11	163		HPV33	L2	8	195
HPV33	L2	9	440		HPV33	L2	9	195
HPV33	L2	10	440		HPV33	L2	11	195
HPV33	L2	10	201		HPV33	L2	8	397

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	L2	9	397	HPV33	L2	11	233
HPV33	L2	8	231	HPV33	L2	8	19
HPV33	L2	11	231	HPV33	L2	10	153
HPV33	L2	8	391	HPV33	L2	8	234
HPV33	L2	10	143	HPV33	L2	10	234
HPV33	L2	8	209	HPV33	L2	11	234
HPV33	L2	9	174	HPV33	L2	10	11
HPV33	L2	11	255	HPV33	L2	8	321
HPV33	L2	10	240	HPV33	L2	11	321
HPV33	L2	11	240	HPV33	L2	9	224
HPV33	L2	9	139	HPV33	L2	9	68
HPV33	L2	9	290	HPV33	L2	9	388
HPV33	L2	10	290	HPV33	L2	11	388
HPV33	L2	11	172	HPV33	L2	8	303
HPV33	L2	8	275	HPV33	L2	10	303
HPV33	L2	10	275	HPV33	L2	8	134
HPV33	L2	11	275	HPV33	L2	9	134
HPV33	L2	8	73	HPV33	L2	11	134
HPV33	L2	9	73	HPV33	L2	8	13
HPV33	L2	10	73	HPV33	L2	11	13
HPV33	L2	11	73	HPV33	L2	9	357
HPV33	L2	8	215	HPV33	L2	11	357
HPV33	L2	9	215	HPV33	L2	10	393
HPV33	L2	11	215	HPV33	L2	10	122
HPV33	L2	8	87	HPV33	L2	11	122
HPV33	L2	10	87	HPV33	L2	9	151
HPV33	L2	11	87	HPV33	L2	9	103
HPV33	L2	10	423	HPV33	L2	9	49
HPV33	L2	11	423	HPV33	L2	11	49
HPV33	L2	8	330	HPV33	L2	9	106
HPV33	L2	9	330	HPV33	L2	11	106
HPV33	L2	9	99	HPV33	L2	8	204
HPV33	L2	10	99	HPV33	L2	11	204
HPV33	L2	10	413	HPV33	L2	8	382
HPV33	L2	8	395	HPV33	L2	11	382
HPV33	L2	10	395	HPV33	L2	9	156
HPV33	L2	11	395	HPV33	L2	8	38
HPV33	L2	9	84	HPV33	L2	10	213
HPV33	L2	10	84	HPV33	L2	11	213
HPV33	L2	11	84	HPV33	L2	8	189
HPV33	L2	9	197	HPV33	L2	10	189
HPV33	L2	8	376	HPV33	L2	9	6
HPV33	L2	10	376	HPV33	L2	10	6
HPV33	L2	11	376	HPV33	L2	11	352
HPV33	L2	10	79	HPV33	L2	9	146
HPV33	L2	8	161	HPV33	L2	10	146
HPV33	L2	9	161	HPV33	L2	9	167
HPV33	L2	8	124	HPV33	L2	11	167
HPV33	L2	9	124	HPV33	L2	9	80
HPV33	L2	10	124	HPV33	L2	9	154
HPV33	L2	9	416	HPV33	L2	11	154
HPV33	L2	11	186	HPV33	L2	10	432
HPV33	L2	8	403	HPV33	L2	11	432
HPV33	L2	10	91	HPV33	L2	10	309
HPV33	L2	8	43	HPV33	L2	9	265
HPV33	L2	10	43	HPV33	L2	9	15
HPV33	L2	8	16	HPV33	L2	10	15
HPV33	L2	9	16	HPV33	L2	10	232
HPV33	L2	11	16	HPV33	L2	9	190
HPV33	L2	9	233	HPV33	L2	11	190

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV33	L2	8	137	HPV45	E1	11	373
HPV33	L2	11	137	HPV45	E1	8	40
HPV33	L2	9	386	HPV45	E1	9	40
HPV33	L2	11	386	HPV45	E1	10	251
HPV33	L2	9	132	HPV45	E1	9	202
HPV33	L2	10	132	HPV45	E1	10	399
HPV33	L2	11	132	HPV45	E1	11	398
HPV33	L2	8	93	HPV45	E1	8	465
HPV33	L2	9	96	HPV45	E1	10	465
HPV33	L2	10	96	HPV45	E1	8	259
HPV33	L2	9	337	HPV45	E1	9	259
HPV33	L2	11	298	HPV45	E1	10	259
HPV33	L2	10	187	HPV45	E1	11	259
HPV33	L2	11	222	HPV45	E1	9	297
HPV33	L2	9	31	HPV45	E1	10	390
HPV33	L2	10	31	HPV45	E1	11	390
HPV33	L2	11	31	HPV45	E1	8	226
HPV33	L2	8	168	HPV45	E1	11	226
HPV33	L2	10	168	HPV45	E1	10	634
HPV33	L2	8	441	HPV45	E1	11	621
HPV33	L2	9	441	HPV45	E1	8	78
HPV33	L2	11	404	HPV45	E1	8	516
HPV33	L2	8	131	HPV45	E1	8	206
HPV33	L2	10	131	HPV45	E1	10	206
HPV33	L2	11	131	HPV45	E1	11	206
HPV33	L2	9	92	HPV45	E1	9	614
HPV33	L2	8	434	HPV45	E1	11	614
HPV33	L2	9	434	HPV45	E1	9	349
HPV33	L2	8	237	HPV45	E1	9	108
HPV33	L2	9	202	HPV45	E1	11	108
HPV33	L2	10	202	HPV45	E1	8	361
HPV33	L2	8	366	HPV45	E1	9	361
HPV33	L2	10	366	HPV45	E1	11	214
HPV33	L2	8	325	HPV45	E1	9	367
HPV33	L2	10	325	HPV45	E1	10	367
HPV33	L2	9	18	HPV45	E1	8	46
HPV33	L2	10	71	HPV45	E1	10	46
HPV33	L2	11	71	HPV45	E1	11	352
HPV45	E1	11	382	HPV45	E1	8	106
HPV45	E1	8	144	HPV45	E1	11	106
HPV45	E1	10	144	HPV45	E1	9	623
HPV45	E1	10	383	HPV45	E1	10	42
HPV45	E1	8	310	HPV45	E1	10	508
HPV45	E1	10	310	HPV45	E1	11	508
HPV45	E1	10	198	HPV45	E1	9	328
HPV45	E1	8	232	HPV45	E1	10	328
HPV45	E1	9	232	HPV45	E1	11	328
HPV45	E1	10	232	HPV45	E1	10	52
HPV45	E1	9	532	HPV45	E1	10	30
HPV45	E1	8	68	HPV45	E1	11	30
HPV45	E1	9	452	HPV45	E1	8	143
HPV45	E1	9	311	HPV45	E1	9	143
HPV45	E1	9	199	HPV45	E1	11	143
HPV45	E1	9	512	HPV45	E1	11	115
HPV45	E1	10	66	HPV45	E1	8	186
HPV45	E1	8	72	HPV45	E1	10	189
HPV45	E1	10	72	HPV45	E1	11	189
HPV45	E1	11	72	HPV45	E1	8	59
HPV45	E1	8	408	HPV45	E1	10	59
HPV45	E1	10	373	HPV45	E1	11	59

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45 E1	8	62		HPV45 E1	11	257
HPV45 E1	11	62		HPV45 E1	11	333
HPV45 E1	9	101		HPV45 E1	8	184
HPV45 E1	9	64		HPV45 E1	10	184
HPV45 E1	10	38		HPV45 E1	9	23
HPV45 E1	11	38		HPV45 E1	10	23
HPV45 E1	11	295		HPV45 E1	10	435
HPV45 E1	8	21		HPV45 E1	11	197
HPV45 E1	11	21		HPV45 E1	8	124
HPV45 E1	8	146		HPV45 E1	9	124
HPV45 E1	10	146		HPV45 E1	11	425
HPV45 E1	9	141		HPV45 E1	8	304
HPV45 E1	10	141		HPV45 E1	9	304
HPV45 E1	11	141		HPV45 E1	8	245
HPV45 E1	8	74		HPV45 E1	9	245
HPV45 E1	9	74		HPV45 E1	11	245
HPV45 E1	11	74		HPV45 E1	8	223
HPV45 E1	10	324		HPV45 E1	9	223
HPV45 E1	11	89		HPV45 E1	10	223
HPV45 E1	8	50		HPV45 E1	11	223
HPV45 E1	8	483		HPV45 E1	8	510
HPV45 E1	9	483		HPV45 E1	9	510
HPV45 E1	10	483		HPV45 E1	11	510
HPV45 E1	8	446		HPV45 E1	8	375
HPV45 E1	11	456		HPV45 E1	9	375
HPV45 E1	8	385		HPV45 E1	10	375
HPV45 E1	11	385		HPV45 E1	8	506
HPV45 E1	10	486		HPV45 E1	9	506
HPV45 E1	9	449		HPV45 E1	10	201
HPV45 E1	10	438		HPV45 E1	11	299
HPV45 E1	10	19		HPV45 E1	9	247
HPV45 E1	10	494		HPV45 E1	11	247
HPV45 E1	9	342		HPV45 E1	9	290
HPV45 E1	10	626		HPV45 E1	10	290
HPV45 E1	11	626		HPV45 E1	11	290
HPV45 E1	8	318		HPV45 E1	9	190
HPV45 E1	8	209		HPV45 E1	10	190
HPV45 E1	8	286		HPV45 E1	11	190
HPV45 E1	11	286		HPV45 E1	9	547
HPV45 E1	8	480		HPV45 E1	10	547
HPV45 E1	11	480		HPV45 E1	11	547
HPV45 E1	11	630		HPV45 E1	11	271
HPV45 E1	10	11		HPV45 E1	9	556
HPV45 E1	8	459		HPV45 E1	8	467
HPV45 E1	9	459		HPV45 E1	8	191
HPV45 E1	10	459		HPV45 E1	9	191
HPV45 E1	8	443		HPV45 E1	10	191
HPV45 E1	10	443		HPV45 E1	11	191
HPV45 E1	11	443		HPV45 E1	9	487
HPV45 E1	8	265		HPV45 E1	8	548
HPV45 E1	9	71		HPV45 E1	9	548
HPV45 E1	11	71		HPV45 E1	10	548
HPV45 E1	11	256		HPV45 E1	11	548
HPV45 E1	8	83		HPV45 E1	8	362
HPV45 E1	11	519		HPV45 E1	8	336
HPV45 E1	8	292		HPV45 E1	8	557
HPV45 E1	9	292		HPV45 E1	9	281
HPV45 E1	10	555		HPV45 E1	10	281
HPV45 E1	9	466		HPV45 E1	11	281
HPV45 E1	10	257		HPV45 E1	10	215

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	E1	11	215		HPV45	E1	8	54
HPV45	E1	8	368		HPV45	E1	8	102
HPV45	E1	9	368		HPV45	E1	8	412
HPV45	E1	9	231		HPV45	E1	11	80
HPV45	E1	10	231		HPV45	E1	8	148
HPV45	E1	11	231		HPV45	E1	10	451
HPV45	E1	8	200		HPV45	E1	9	407
HPV45	E1	11	200		HPV45	E1	11	612
HPV45	E1	8	513		HPV45	E1	9	335
HPV45	E1	11	513		HPV45	E1	8	280
HPV45	E1	8	298		HPV45	E1	10	280
HPV45	E1	9	47		HPV45	E1	11	280
HPV45	E1	11	47		HPV45	E1	9	411
HPV45	E1	10	353		HPV45	E1	10	316
HPV45	E1	11	353		HPV45	E1	8	608
HPV45	E1	8	154		HPV45	E1	10	575
HPV45	E1	11	154		HPV45	E1	10	56
HPV45	E1	11	174		HPV45	E1	11	56
HPV45	E1	8	531		HPV45	E1	9	539
HPV45	E1	10	531		HPV45	E1	10	539
HPV45	E1	9	321		HPV45	E1	8	183
HPV45	E1	9	473		HPV45	E1	9	183
HPV45	E1	10	152		HPV45	E1	11	183
HPV45	E1	8	177		HPV45	E1	9	117
HPV45	E1	9	177		HPV45	E1	11	416
HPV45	E1	11	177		HPV45	E1	9	288
HPV45	E1	10	563		HPV45	E1	11	288
HPV45	E1	11	471		HPV45	E1	10	308
HPV45	E1	8	250		HPV45	E1	10	104
HPV45	E1	11	250		HPV45	E1	8	65
HPV45	E1	8	554		HPV45	E1	11	65
HPV45	E1	11	554		HPV45	E1	9	39
HPV45	E1	11	537		HPV45	E1	10	39
HPV45	E1	11	434		HPV45	E1	10	22
HPV45	E1	8	505		HPV45	E1	11	22
HPV45	E1	9	505		HPV45	E1	8	246
HPV45	E1	10	505		HPV45	E1	10	246
HPV45	E1	8	98		HPV45	E1	8	289
HPV45	E1	10	98		HPV45	E1	10	289
HPV45	E1	10	546		HPV45	E1	11	289
HPV45	E1	11	546		HPV45	E1	9	252
HPV45	E1	9	238		HPV45	E1	9	53
HPV45	E1	10	238		HPV45	E1	9	147
HPV45	E1	11	238		HPV45	E1	8	224
HPV45	E1	9	60		HPV45	E1	9	224
HPV45	E1	10	60		HPV45	E1	10	224
HPV45	E1	9	391		HPV45	E1	8	239
HPV45	E1	10	391		HPV45	E1	9	239
HPV45	E1	11	391		HPV45	E1	10	239
HPV45	E1	9	67		HPV45	E1	8	282
HPV45	E1	8	192		HPV45	E1	9	282
HPV45	E1	9	192		HPV45	E1	10	282
HPV45	E1	10	192		HPV45	E1	8	577
HPV45	E1	11	192		HPV45	E1	9	309
HPV45	E1	9	374		HPV45	E1	11	309
HPV45	E1	10	374		HPV45	E1	8	240
HPV45	E1	11	374		HPV45	E1	9	240
HPV45	E1	8	549		HPV45	E1	8	283
HPV45	E1	9	549		HPV45	E1	9	283
HPV45	E1	10	549		HPV45	E1	11	283

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	E1	8	511	HPV45	E2	10	343
HPV45	E1	10	511	HPV45	E2	11	343
HPV45	E1	9	31	HPV45	E2	8	192
HPV45	E1	10	31	HPV45	E2	9	192
HPV45	E1	11	31	HPV45	E2	11	349
HPV45	E1	10	81	HPV45	E2	8	50
HPV45	E1	10	230	HPV45	E2	9	50
HPV45	E1	11	230	HPV45	E2	11	50
HPV45	E1	9	400	HPV45	E2	11	334
HPV45	E1	9	436	HPV45	E2	9	56
HPV45	E1	8	75	HPV45	E2	10	56
HPV45	E1	10	75	HPV45	E2	8	150
HPV45	E1	11	75	HPV45	E2	10	150
HPV45	E1	9	354	HPV45	E2	10	255
HPV45	E1	10	354	HPV45	E2	9	237
HPV45	E1	9	635	HPV45	E2	11	237
HPV45	E1	9	576	HPV45	E2	10	163
HPV45	E1	8	356	HPV45	E2	11	163
HPV45	E1	9	418	HPV45	E2	9	225
HPV45	E1	8	332	HPV45	E2	10	225
HPV45	E1	8	502	HPV45	E2	9	295
HPV45	E1	10	502	HPV45	E2	9	62
HPV45	E1	11	502	HPV45	E2	11	267
HPV45	E1	8	522	HPV45	E2	11	293
HPV45	E1	11	522	HPV45	E2	10	48
HPV45	E1	8	229	HPV45	E2	11	48
HPV45	E1	11	229	HPV45	E2	10	335
HPV45	E1	11	372	HPV45	E2	10	146
HPV45	E1	8	571	HPV45	E2	11	146
HPV45	E1	10	571	HPV45	E2	8	57
HPV45	E1	8	394	HPV45	E2	9	57
HPV45	E1	11	528	HPV45	E2	8	219
HPV45	E1	10	441	HPV45	E2	10	219
HPV45	E2	9	156	HPV45	E2	8	74
HPV45	E2	8	78	HPV45	E2	10	74
HPV45	E2	11	78	HPV45	E2	11	74
HPV45	E2	11	47	HPV45	E2	8	77
HPV45	E2	11	89	HPV45	E2	9	77
HPV45	E2	10	247	HPV45	E2	10	59
HPV45	E2	11	247	HPV45	E2	9	2
HPV45	E2	8	216	HPV45	E2	11	154
HPV45	E2	11	216	HPV45	E2	8	284
HPV45	E2	10	305	HPV45	E2	10	284
HPV45	E2	10	134	HPV45	E2	11	284
HPV45	E2	10	158	HPV45	E2	8	41
HPV45	E2	11	31	HPV45	E2	9	41
HPV45	E2	9	102	HPV45	E2	11	41
HPV45	E2	8	212	HPV45	E2	8	100
HPV45	E2	9	212	HPV45	E2	11	100
HPV45	E2	9	351	HPV45	E2	8	223
HPV45	E2	11	351	HPV45	E2	11	223
HPV45	E2	9	319	HPV45	E2	8	81
HPV45	E2	9	80	HPV45	E2	9	81
HPV45	E2	10	80	HPV45	E2	9	256
HPV45	E2	9	258	HPV45	E2	11	256
HPV45	E2	11	258	HPV45	E2	9	336
HPV45	E2	8	148	HPV45	E2	8	3
HPV45	E2	9	148	HPV45	E2	10	69
HPV45	E2	10	148	HPV45	E2	11	69
HPV45	E2	8	343	HPV45	E2	8	347

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	E2	9	347		HPV45	E2	8	354
HPV45	E2	8	332		HPV45	E2	10	354
HPV45	E2	8	265		HPV45	E2	9	99
HPV45	E2	9	265		HPV45	E2	10	217
HPV45	E2	8	289		HPV45	E2	8	213
HPV45	E2	11	189		HPV45	E2	11	213
HPV45	E2	9	198		HPV45	E2	8	337
HPV45	E2	11	246		HPV45	E2	8	199
HPV45	E2	9	67		HPV45	E2	11	199
HPV45	E2	8	360		HPV45	E2	8	359
HPV45	E2	9	360		HPV45	E2	9	359
HPV45	E2	8	35		HPV45	E2	10	359
HPV45	E2	10	35		HPV45	E2	9	344
HPV45	E2	9	218		HPV45	E2	10	344
HPV45	E2	11	218		HPV45	E2	11	344
HPV45	E2	8	40		HPV45	E2	8	193
HPV45	E2	9	40		HPV45	E2	9	353
HPV45	E2	10	40		HPV45	E2	11	353
HPV45	E2	9	222		HPV45	E2	11	338
HPV45	E2	8	82		HPV45	E2	8	352
HPV45	E2	11	4		HPV45	E2	10	352
HPV45	E2	8	63		HPV45	E2	9	138
HPV45	E2	9	43		HPV45	E2	10	138
HPV45	E2	10	43		HPV45	E2	9	39
HPV45	E2	9	13		HPV45	E2	10	39
HPV45	E2	10	13		HPV45	E2	11	39
HPV45	E2	8	221		HPV45	E2	8	326
HPV45	E2	10	221		HPV45	E2	10	326
HPV45	E2	10	263		HPV45	E2	11	326
HPV45	E2	11	263		HPV45	E2	10	98
HPV45	E2	8	15		HPV45	E2	8	313
HPV45	E2	9	215		HPV45	E2	11	313
HPV45	E2	8	142		HPV45	E2	8	166
HPV45	E2	10	142		HPV45	E2	11	166
HPV45	E2	9	302		HPV45	E2	11	145
HPV45	E2	8	9		HPV45	E2	10	137
HPV45	E2	9	9		HPV45	E2	11	137
HPV45	E2	9	205		HPV45	E6	8	37
HPV45	E2	10	205		HPV45	E6	11	59
HPV45	E2	10	113		HPV45	E6	8	68
HPV45	E2	11	113		HPV45	E6	11	68
HPV45	E2	8	34		HPV45	E6	8	105
HPV45	E2	9	34		HPV45	E6	11	105
HPV45	E2	11	34		HPV45	E6	8	108
HPV45	E2	8	229		HPV45	E6	8	18
HPV45	E2	10	229		HPV45	E6	11	18
HPV45	E2	9	208		HPV45	E6	8	32
HPV45	E2	10	208		HPV45	E6	11	32
HPV45	E2	10	276		HPV45	E6	8	16
HPV45	E2	8	227		HPV45	E6	10	16
HPV45	E2	10	227		HPV45	E6	10	51
HPV45	E2	9	235		HPV45	E6	11	51
HPV45	E2	11	235		HPV45	E6	8	143
HPV45	E2	9	358		HPV45	E6	11	27
HPV45	E2	10	358		HPV45	E6	9	20
HPV45	E2	11	358		HPV45	E6	11	20
HPV45	E2	10	155		HPV45	E6	9	77
HPV45	E2	8	51		HPV45	E6	10	97
HPV45	E2	10	51		HPV45	E6	9	88
HPV45	E2	11	233		HPV45	E6	11	88

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	E6	10	43	HPV45 E7	8	83
HPV45	E6	8	47	HPV45 E7	10	83
HPV45	E6	9	47	HPV45 E7	8	41
HPV45	E6	8	53	HPV45 E7	10	41
HPV45	E6	9	53	HPV45 E7	8	20
HPV45	E6	11	53	HPV45 E7	8	74
HPV45	E6	10	136	HPV45 E7	11	74
HPV45	E6	9	132	HPV45 E7	8	91
HPV45	E6	11	120	HPV45 E7	8	97
HPV45	E6	8	30	HPV45 E7	9	44
HPV45	E6	9	30	HPV45 E7	9	47
HPV45	E6	10	30	HPV45 E7	8	14
HPV45	E6	11	130	HPV45 E7	11	14
HPV45	E6	10	60	HPV45 E7	11	11
HPV45	E6	9	93	HPV45 E7	8	8
HPV45	E6	10	93	HPV45 E7	8	87
HPV45	E6	11	93	HPV45 E7	9	87
HPV45	E6	8	54	HPV45 E7	10	75
HPV45	E6	10	54	HPV45 E7	8	17
HPV45	E6	11	54	HPV45 E7	10	17
HPV45	E6	9	36	HPV45 E7	11	17
HPV45	E6	10	92	HPV45 E7	9	57
HPV45	E6	11	92	HPV45 E7	10	23
HPV45	E6	9	13	HPV45 E7	10	89
HPV45	E6	11	13	HPV45 E7	8	88
HPV45	E6	11	102	HPV45 E7	11	88
HPV45	E6	9	25	HPV45 E7	9	54
HPV45	E6	8	1	HPV45 E7	10	54
HPV45	E6	8	95	HPV45 E7	8	5
HPV45	E6	9	95	HPV45 E7	9	5
HPV45	E6	9	22	HPV45 E7	11	5
HPV45	E6	10	22	HPV45 E7	10	72
HPV45	E6	8	114	HPV45 E7	8	85
HPV45	E6	11	111	HPV45 E7	10	85
HPV45	E6	8	7	HPV45 E7	11	85
HPV45	E6	11	7	HPV45 E7	8	80
HPV45	E6	8	149	HPV45 E7	11	80
HPV45	E6	10	149	HPV45 E7	11	93
HPV45	E6	11	146	HPV45 E7	9	7
HPV45	E6	8	41	HPV45 E7	9	86
HPV45	E6	9	29	HPV45 E7	10	86
HPV45	E6	10	29	HPV45 E7	10	94
HPV45	E6	11	29	HPV45 E7	11	94
HPV45	E6	8	24	HPV45 E7	9	76
HPV45	E6	10	24	HPV45 E7	11	76
HPV45	E6	10	84	HPV45 E7	10	12
HPV45	E6	11	84	HPV45 L1	11	517
HPV45	E6	8	89	HPV45 L1	10	161
HPV45	E6	10	89	HPV45 L1	10	191
HPV45	E6	11	38	HPV45 L1	10	191
HPV45	E6	10	8	HPV45 L1	10	103
HPV45	E6	8	62	HPV45 L1	9	28
HPV45	E6	8	45	HPV45 L1	10	28
HPV45	E6	10	45	HPV45 L1	10	234
HPV45	E6	11	45	HPV45 L1	8	345
HPV45	E7	8	48	HPV45 L1	11	205
HPV45	E7	8	6	HPV45 L1	9	162
HPV45	E7	10	6	HPV45 L1	11	164
HPV45	E7	10	64	HPV45 L1	8	455
HPV45	E7	8	25	HPV45 L1	9	455

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45 L1	8	374		HPV45 L1	11	351
HPV45 L1	11	374		HPV45 L1	9	10
HPV45 L1	8	184		HPV45 L1	11	10
HPV45 L1	9	184		HPV45 L1	8	503
HPV45 L1	9	276		HPV45 L1	11	143
HPV45 L1	11	252		HPV45 L1	10	131
HPV45 L1	9	409		HPV45 L1	8	137
HPV45 L1	10	409		HPV45 L1	9	199
HPV45 L1	10	188		HPV45 L1	9	306
HPV45 L1	11	318		HPV45 L1	9	292
HPV45 L1	10	480		HPV45 L1	11	292
HPV45 L1	8	401		HPV45 L1	8	435
HPV45 L1	10	401		HPV45 L1	10	435
HPV45 L1	11	401		HPV45 L1	11	435
HPV45 L1	9	301		HPV45 L1	8	160
HPV45 L1	11	301		HPV45 L1	11	160
HPV45 L1	9	226		HPV45 L1	8	62
HPV45 L1	10	226		HPV45 L1	9	62
HPV45 L1	10	490		HPV45 L1	10	62
HPV45 L1	11	490		HPV45 L1	10	396
HPV45 L1	8	155		HPV45 L1	8	221
HPV45 L1	9	155		HPV45 L1	10	221
HPV45 L1	10	155		HPV45 L1	9	12
HPV45 L1	11	155		HPV45 L1	8	11
HPV45 L1	11	229		HPV45 L1	10	11
HPV45 L1	8	242		HPV45 L1	8	5
HPV45 L1	10	242		HPV45 L1	9	5
HPV45 L1	8	364		HPV45 L1	11	5
HPV45 L1	9	364		HPV45 L1	9	428
HPV45 L1	10	364		HPV45 L1	8	185
HPV45 L1	9	296		HPV45 L1	8	411
HPV45 L1	9	446		HPV45 L1	11	411
HPV45 L1	10	446		HPV45 L1	9	166
HPV45 L1	11	446		HPV45 L1	11	166
HPV45 L1	8	169		HPV45 L1	8	328
HPV45 L1	8	133		HPV45 L1	9	344
HPV45 L1	10	133		HPV45 L1	8	152
HPV45 L1	8	121		HPV45 L1	10	152
HPV45 L1	10	121		HPV45 L1	11	152
HPV45 L1	9	416		HPV45 L1	9	473
HPV45 L1	10	246		HPV45 L1	9	86
HPV45 L1	9	283		HPV45 L1	8	467
HPV45 L1	11	283		HPV45 L1	8	179
HPV45 L1	8	404		HPV45 L1	11	179
HPV45 L1	9	404		HPV45 L1	9	91
HPV45 L1	10	404		HPV45 L1	11	68
HPV45 L1	11	404		HPV45 L1	8	240
HPV45 L1	10	14		HPV45 L1	10	240
HPV45 L1	8	406		HPV45 L1	9	402
HPV45 L1	9	406		HPV45 L1	10	402
HPV45 L1	10	406		HPV45 L1	11	402
HPV45 L1	8	450		HPV45 L1	9	207
HPV45 L1	8	359		HPV45 L1	11	207
HPV45 L1	11	359		HPV45 L1	9	413
HPV45 L1	8	82		HPV45 L1	11	371
HPV45 L1	11	82		HPV45 L1	10	69
HPV45 L1	8	233		HPV45 L1	11	69
HPV45 L1	11	233		HPV45 L1	8	444
HPV45 L1	8	351		HPV45 L1	11	444
HPV45 L1	10	351		HPV45 L1	11	499

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	L1	8	125		HPV45	L1	9	290
HPV45	L1	10	125		HPV45	L1	11	290
HPV45	L1	11	1		HPV45	L1	9	124
HPV45	L1	10	27		HPV45	L1	11	124
HPV45	L1	11	27		HPV45	L1	8	56
HPV45	L1	8	227		HPV45	L1	9	46
HPV45	L1	9	227		HPV45	L1	9	265
HPV45	L1	8	4		HPV45	L1	8	158
HPV45	L1	9	4		HPV45	L1	9	158
HPV45	L1	10	4		HPV45	L1	10	158
HPV45	L1	8	370		HPV45	L1	10	93
HPV45	L1	10	310		HPV45	L1	11	93
HPV45	L1	8	356		HPV45	L1	9	254
HPV45	L1	10	356		HPV45	L1	11	254
HPV45	L1	11	356		HPV45	L1	11	58
HPV45	L1	9	49		HPV45	L1	10	427
HPV45	L1	11	49		HPV45	L1	9	327
HPV45	L1	9	219		HPV45	L1	9	443
HPV45	L1	10	219		HPV45	L1	11	272
HPV45	L1	9	19		HPV45	L1	10	333
HPV45	L1	10	19		HPV45	L1	10	521
HPV45	L1	11	19		HPV45	L1	8	115
HPV45	L1	9	17		HPV45	L1	11	115
HPV45	L1	11	17		HPV45	L1	10	238
HPV45	L1	9	173		HPV45	L1	8	368
HPV45	L1	11	173		HPV45	L1	10	368
HPV45	L1	8	516		HPV45	L1	9	376
HPV45	L1	8	190		HPV45	L1	9	519
HPV45	L1	11	190		HPV45	L1	10	35
HPV45	L1	8	22		HPV45	L1	11	35
HPV45	L1	8	248		HPV45	L1	8	43
HPV45	L1	8	214		HPV45	L1	10	453
HPV45	L1	9	214		HPV45	L1	11	453
HPV45	L1	8	493		HPV45	L1	9	175
HPV45	L1	10	493		HPV45	L1	11	175
HPV45	L1	9	299		HPV45	L1	8	414
HPV45	L1	11	299		HPV45	L1	11	414
HPV45	L1	10	508		HPV45	L1	9	522
HPV45	L1	11	508		HPV45	L1	11	522
HPV45	L1	11	387		HPV45	L1	8	163
HPV45	L1	8	440		HPV45	L1	9	509
HPV45	L1	9	380		HPV45	L1	10	509
HPV45	L1	9	501		HPV45	L1	8	220
HPV45	L1	10	501		HPV45	L1	9	220
HPV45	L1	8	87		HPV45	L1	11	220
HPV45	L1	8	182		HPV45	L1	8	410
HPV45	L1	10	182		HPV45	L1	9	410
HPV45	L1	11	182		HPV45	L1	10	116
HPV45	L1	8	407		HPV45	L1	11	116
HPV45	L1	9	407		HPV45	L1	10	372
HPV45	L1	11	407		HPV45	L1	8	200
HPV45	L1	11	281		HPV45	L1	9	239
HPV45	L1	9	334		HPV45	L1	11	239
HPV45	L1	9	357		HPV45	L1	10	412
HPV45	L1	10	357		HPV45	L1	8	167
HPV45	L1	10	206		HPV45	L1	10	167
HPV45	L1	11	26		HPV45	L1	9	181
HPV45	L1	11	263		HPV45	L1	11	181
HPV45	L1	10	180		HPV45	L1	8	377
HPV45	L1	8	290		HPV45	L1	9	122

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	L1	11	122	HPV45	L2	9	278
HPV45	L1	8	365	HPV45	L2	10	278
HPV45	L1	9	365	HPV45	L2	8	322
HPV45	L1	11	365	HPV45	L2	11	322
HPV45	L1	11	441	HPV45	L2	9	142
HPV45	L1	9	70	HPV45	L2	11	142
HPV45	L1	10	70	HPV45	L2	11	16
HPV45	L1	8	297	HPV45	L2	9	260
HPV45	L1	11	297	HPV45	L2	9	83
HPV45	L1	9	361	HPV45	L2	10	83
HPV45	L1	11	361	HPV45	L2	11	83
HPV45	L1	9	36	HPV45	L2	9	30
HPV45	L1	10	36	HPV45	L2	10	30
HPV45	L1	11	102	HPV45	L2	11	30
HPV45	L1	11	44	HPV45	L2	10	397
HPV45	L1	9	454	HPV45	L2	11	397
HPV45	L1	10	454	HPV45	L2	10	348
HPV45	L1	10	165	HPV45	L2	8	331
HPV45	L1	8	293	HPV45	L2	10	331
HPV45	L1	10	293	HPV45	L2	11	331
HPV45	L1	8	417	HPV45	L2	8	194
HPV45	L1	10	500	HPV45	L2	8	129
HPV45	L1	11	500	HPV45	L2	9	129
HPV45	L1	8	456	HPV45	L2	11	129
HPV45	L1	10	360	HPV45	L2	8	333
HPV45	L1	8	362	HPV45	L2	9	333
HPV45	L1	10	362	HPV45	L2	8	169
HPV45	L1	11	362	HPV45	L2	8	175
HPV45	L1	8	47	HPV45	L2	10	175
HPV45	L1	11	47	HPV45	L2	8	456
HPV45	L1	11	78	HPV45	L2	8	200
HPV45	L1	8	127	HPV45	L2	11	200
HPV45	L1	10	196	HPV45	L2	9	53
HPV45	L1	9	420	HPV45	L2	8	241
HPV45	L1	10	420	HPV45	L2	9	241
HPV45	L1	9	303	HPV45	L2	10	241
HPV45	L1	8	38	HPV45	L2	11	276
HPV45	L1	10	38	HPV45	L2	9	122
HPV45	L1	11	38	HPV45	L2	10	122
HPV45	L1	8	95	HPV45	L2	11	157
HPV45	L1	9	95	HPV45	L2	8	306
HPV45	L1	10	95	HPV45	L2	8	368
HPV45	L1	11	53	HPV45	L2	9	368
HPV45	L2	9	6	HPV45	L2	10	368
HPV45	L2	10	6	HPV45	L2	8	116
HPV45	L2	8	381	HPV45	L2	10	116
HPV45	L2	9	381	HPV45	L2	9	51
HPV45	L2	10	381	HPV45	L2	11	51
HPV45	L2	8	327	HPV45	L2	9	430
HPV45	L2	11	327	HPV45	L2	8	300
HPV45	L2	8	286	HPV45	L2	8	25
HPV45	L2	9	286	HPV45	L2	11	25
HPV45	L2	10	328	HPV45	L2	8	206
HPV45	L2	11	328	HPV45	L2	10	206
HPV45	L2	11	303	HPV45	L2	10	60
HPV45	L2	10	340	HPV45	L2	8	124
HPV45	L2	8	139	HPV45	L2	8	37
HPV45	L2	9	139	HPV45	L2	9	37
HPV45	L2	8	405	HPV45	L2	8	134
HPV45	L2	10	405	HPV45	L2	10	134

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	L2	11	134		HPV45	L2	8	325
HPV45	L2	8	292		HPV45	L2	10	325
HPV45	L2	8	411		HPV45	L2	9	209
HPV45	L2	11	411		HPV45	L2	10	209
HPV45	L2	9	326		HPV45	L2	8	399
HPV45	L2	10	167		HPV45	L2	9	399
HPV45	L2	9	406		HPV45	L2	10	399
HPV45	L2	8	279		HPV45	L2	11	258
HPV45	L2	9	279		HPV45	L2	8	73
HPV45	L2	8	407		HPV45	L2	9	73
HPV45	L2	9	44		HPV45	L2	10	73
HPV45	L2	11	44		HPV45	L2	11	336
HPV45	L2	8	143		HPV45	L2	8	214
HPV45	L2	10	143		HPV45	L2	8	391
HPV45	L2	8	130		HPV45	L2	10	391
HPV45	L2	10	130		HPV45	L2	9	413
HPV45	L2	11	130		HPV45	L2	11	413
HPV45	L2	10	103		HPV45	L2	10	171
HPV45	L2	11	103		HPV45	L2	8	98
HPV45	L2	8	43		HPV45	L2	9	98
HPV45	L2	10	43		HPV45	L2	10	98
HPV45	L2	10	22		HPV45	L2	11	120
HPV45	L2	11	22		HPV45	L2	8	420
HPV45	L2	8	34		HPV45	L2	10	420
HPV45	L2	11	34		HPV45	L2	8	86
HPV45	L2	11	40		HPV45	L2	11	86
HPV45	L2	10	337		HPV45	L2	11	185
HPV45	L2	8	334		HPV45	L2	11	267
HPV45	L2	11	197		HPV45	L2	8	145
HPV45	L2	8	45		HPV45	L2	11	145
HPV45	L2	10	45		HPV45	L2	11	216
HPV45	L2	8	242		HPV45	L2	9	95
HPV45	L2	9	242		HPV45	L2	10	95
HPV45	L2	8	375		HPV45	L2	11	95
HPV45	L2	9	392		HPV45	L2	8	118
HPV45	L2	11	392		HPV45	L2	10	90
HPV45	L2	8	106		HPV45	L2	11	232
HPV45	L2	9	106		HPV45	L2	10	198
HPV45	L2	8	248		HPV45	L2	9	172
HPV45	L2	8	422		HPV45	L2	11	172
HPV45	L2	10	422		HPV45	L2	10	233
HPV45	L2	8	179		HPV45	L2	11	233
HPV45	L2	8	231		HPV45	L2	8	5
HPV45	L2	9	79		HPV45	L2	10	5
HPV45	L2	8	270		HPV45	L2	11	5
HPV45	L2	10	270		HPV45	L2	8	229
HPV45	L2	11	270		HPV45	L2	10	229
HPV45	L2	9	387		HPV45	L2	10	11
HPV45	L2	8	160		HPV45	L2	11	451
HPV45	L2	9	160		HPV45	L2	8	298
HPV45	L2	11	160		HPV45	L2	10	298
HPV45	L2	9	285		HPV45	L2	10	225
HPV45	L2	10	285		HPV45	L2	8	19
HPV45	L2	8	356		HPV45	L2	8	316
HPV45	L2	9	356		HPV45	L2	11	316
HPV45	L2	9	138		HPV45	L2	11	220
HPV45	L2	10	138		HPV45	L2	8	235
HPV45	L2	8	254		HPV45	L2	9	235
HPV45	L2	9	254		HPV45	L2	8	13
HPV45	L2	10	254		HPV45	L2	8	339

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV45	L2	11	339	HPV45	L2	11	249
HPV45	L2	9	394	HPV45	L2	9	104
HPV45	L2	8	166	HPV45	L2	10	104
HPV45	L2	11	166	HPV45	L2	11	104
HPV45	L2	8	151	HPV45	L2	8	388
HPV45	L2	11	151	HPV45	L2	11	388
HPV45	L2	11	102	HPV45	L2	8	112
HPV45	L2	9	49	HPV45	L2	10	112
HPV45	L2	11	49	HPV45	L2	11	81
HPV45	L2	8	374	HPV45	L2	9	91
HPV45	L2	9	374	HPV45	L2	8	350
HPV45	L2	9	247	HPV45	L2	10	350
HPV45	L2	10	239	HPV45	L2	11	350
HPV45	L2	11	239	HPV45	L2	11	428
HPV45	L2	10	379	HPV45	L2	8	401
HPV45	L2	11	379	HPV45	L2	10	71
HPV45	L2	8	362	HPV45	L2	11	71
HPV45	L2	10	212	HPV56	E2	8	15
HPV45	L2	8	154	HPV56	E2	11	15
HPV45	L2	9	417	HPV56	E2	8	21
HPV45	L2	10	417	HPV56	E2	9	21
HPV45	L2	11	417	HPV56	E2	9	4
HPV45	L2	8	424	HPV56	E2	10	71
HPV45	L2	11	424	HPV56	E2	8	204
HPV45	L2	10	149	HPV56	E2	11	204
HPV45	L2	9	111	HPV56	E2	8	39
HPV45	L2	11	111	HPV56	E2	9	39
HPV45	L2	9	380	HPV56	E2	9	263
HPV45	L2	10	380	HPV56	E2	11	263
HPV45	L2	11	380	HPV56	E2	10	117
HPV45	L2	10	262	HPV56	E2	8	288
HPV45	L2	8	105	HPV56	E2	11	288
HPV45	L2	9	105	HPV56	E2	8	154
HPV45	L2	10	105	HPV56	E2	11	154
HPV45	L2	10	304	HPV56	E2	9	128
HPV45	L2	8	38	HPV56	E2	9	17
HPV45	L2	8	261	HPV56	E2	11	17
HPV45	L2	11	261	HPV56	E2	9	294
HPV45	L2	8	136	HPV56	E2	10	294
HPV45	L2	9	136	HPV56	E2	9	254
HPV45	L2	11	136	HPV56	E2	11	254
HPV45	L2	11	359	HPV56	E2	11	261
HPV45	L2	9	135	HPV56	E2	11	99
HPV45	L2	10	135	HPV56	E2	10	94
HPV45	L2	10	425	HPV56	E2	9	201
HPV45	L2	9	426	HPV56	E2	11	201
HPV45	L2	10	146	HPV56	E2	8	210
HPV45	L2	10	389	HPV56	E2	9	239
HPV45	L2	11	293	HPV56	E2	10	208
HPV45	L2	10	217	HPV56	E2	10	297
HPV45	L2	8	80	HPV56	E2	11	297
HPV45	L2	9	113	HPV56	E2	8	20
HPV45	L2	11	113	HPV56	E2	9	20
HPV45	L2	8	92	HPV56	E2	10	20
HPV45	L2	8	31	HPV56	E2	10	280
HPV45	L2	9	31	HPV56	E2	9	281
HPV45	L2	10	31	HPV56	E2	8	11
HPV45	L2	11	31	HPV56	E2	10	11
HPV45	L2	8	140	HPV56	E2	11	11
HPV45	L2	11	140	HPV56	E2	8	9

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV56	E2	10	9	HPV56	E2	8	264
HPV56	E2	8	299	HPV56	E2	10	264
HPV56	E2	9	299	HPV56	E2	10	205
HPV56	E2	8	258	HPV56	E2	11	237
HPV56	E2	10	258	HPV56	E2	8	88
HPV56	E2	8	233	HPV56	E2	10	35
HPV56	E2	8	163	HPV56	E2	11	270
HPV56	E2	10	163	HPV56	E2	8	111
HPV56	E2	11	108	HPV56	E2	8	102
HPV56	E2	11	90	HPV56	E2	11	102
HPV56	E2	8	5	HPV56	E6	11	89
HPV56	E2	11	5	HPV56	E6	8	64
HPV56	E2	9	72	HPV56	E6	8	139
HPV56	E2	10	1	HPV56	E6	8	69
HPV56	E2	9	216	HPV56	E6	8	33
HPV56	E2	8	160	HPV56	E6	9	33
HPV56	E2	9	160	HPV56	E6	11	33
HPV56	E2	11	160	HPV56	E6	9	23
HPV56	E2	8	149	HPV56	E6	11	39
HPV56	E2	10	152	HPV56	E6	8	20
HPV56	E2	9	19	HPV56	E6	10	20
HPV56	E2	10	19	HPV56	E6	8	44
HPV56	E2	11	19	HPV56	E6	10	44
HPV56	E2	10	6	HPV56	E6	8	48
HPV56	E2	11	6	HPV56	E6	9	48
HPV56	E2	8	14	HPV56	E6	8	88
HPV56	E2	9	14	HPV56	E6	8	129
HPV56	E2	11	279	HPV56	E6	8	17
HPV56	E2	8	135	HPV56	E6	10	17
HPV56	E2	11	135	HPV56	E6	11	17
HPV56	E2	10	144	HPV56	E6	10	131
HPV56	E2	9	272	HPV56	E6	9	94
HPV56	E2	10	272	HPV56	E6	10	94
HPV56	E2	11	272	HPV56	E6	11	94
HPV56	E2	9	169	HPV56	E6	11	54
HPV56	E2	10	169	HPV56	E6	8	97
HPV56	E2	11	169	HPV56	E6	11	130
HPV56	E2	11	26	HPV56	E6	9	26
HPV56	E2	8	266	HPV56	E6	11	103
HPV56	E2	8	171	HPV56	E6	8	113
HPV56	E2	9	171	HPV56	E6	10	40
HPV56	E2	10	141	HPV56	E6	10	55
HPV56	E2	8	282	HPV56	E6	11	55
HPV56	E2	9	28	HPV56	E6	10	25
HPV56	E2	10	28	HPV56	E6	9	112
HPV56	E2	9	259	HPV56	E6	8	8
HPV56	E2	9	36	HPV56	E6	11	8
HPV56	E2	11	36	HPV56	E6	10	145
HPV56	E2	10	289	HPV56	E6	11	145
HPV56	E2	9	206	HPV56	E6	8	42
HPV56	E2	10	27	HPV56	E6	10	42
HPV56	E2	11	27	HPV56	E6	11	30
HPV56	E2	11	167	HPV56	E6	11	144
HPV56	E2	8	165	HPV56	E6	10	67
HPV56	E2	9	164	HPV56	E6	10	93
HPV56	E2	10	155	HPV56	E6	11	93
HPV56	E2	11	155	HPV56	E6	8	14
HPV56	E2	8	18	HPV56	E6	9	14
HPV56	E2	10	18	HPV56	E6	11	14
HPV56	E2	11	18	HPV56	E6	10	85

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV56	E6	11	85	HPV56	E7	11	51
HPV56	E6	10	90	HPV56	E7	8	84
HPV56	E6	9	21	HPV56	E7	10	84
HPV56	E6	11	21	HPV56	E7	11	84
HPV56	E6	8	63	HPV56	E7	8	78
HPV56	E6	9	63	HPV56	E7	9	78
HPV56	E7	8	93	HPV56	E7	9	7
HPV56	E7	10	93	HPV56	E7	10	7
HPV56	E7	9	75	HPV56	E7	8	95
HPV56	E7	11	75	HPV56	E7	8	12
HPV56	E7	8	22	HPV56	E7	10	12
HPV56	E7	8	82	HPV55	E7	8	72
HPV56	E7	9	82	HPV56	E7	8	86
HPV56	E7	10	82	HPV56	E7	9	86
HPV56	E7	10	10	HPV56	E7	10	86
HPV56	E7	10	20	HPV56	E7	11	86
HPV56	E7	8	14	HPV56	E7	9	11
HPV56	E7	10	14	HPV56	E7	11	11
HPV56	E7	10	70	HPV56	E7	9	71
HPV56	E7	9	92	HPV56	E7	9	85
HPV56	E7	11	92	HPV56	E7	10	85
HPV56	E7	9	42	HPV56	E7	11	85
HPV56	E7	8	56	HPV56	L1	11	458
HPV56	E7	10	62	HPV56	L1	10	198
HPV56	E7	11	62	HPV56	L1	11	198
HPV56	E7	8	76	HPV56	L1	8	350
HPV56	E7	10	76	HPV56	L1	10	338
HPV56	E7	11	76	HPV56	L1	9	58
HPV56	E7	8	54	HPV56	L1	11	58
HPV56	E7	10	54	HPV56	L1	10	381
HPV56	E7	8	4	HPV56	L1	8	327
HPV56	E7	9	4	HPV56	L1	9	327
HPV56	E7	10	4	HPV56	L1	8	514
HPV56	E7	8	89	HPV56	L1	10	514
HPV56	E7	9	89	HPV56	L1	11	444
HPV56	E7	8	90	HPV56	L1	10	37
HPV56	E7	11	90	HPV56	L1	10	512
HPV56	E7	8	8	HPV56	L1	8	207
HPV56	E7	9	8	HPV56	L1	9	207
HPV56	E7	8	43	HPV56	L1	10	207
HPV56	E7	11	43	HPV56	L1	9	79
HPV56	E7	9	15	HPV56	L1	10	79
HPV56	E7	9	94	HPV56	L1	9	26
HPV56	E7	11	47	HPV56	L1	11	26
HPV56	E7	8	6	HPV56	L1	8	19
HPV56	E7	10	6	HPV56	L1	9	19
HPV56	E7	11	6	HPV56	L1	11	19
HPV56	E7	9	52	HPV56	L1	8	191
HPV56	E7	10	52	HPV56	L1	9	191
HPV56	E7	9	49	HPV56	L1	8	461
HPV56	E7	11	73	HPV56	L1	10	195
HPV56	E7	8	88	HPV56	L1	9	389
HPV56	E7	9	88	HPV56	L1	11	274
HPV56	E7	10	88	HPV56	L1	9	233
HPV56	E7	10	48	HPV56	L1	10	233
HPV56	E7	8	87	HPV56	L1	8	128
HPV56	E7	9	87	HPV56	L1	10	128
HPV56	E7	10	87	HPV56	L1	10	493
HPV56	E7	11	87	HPV56	L1	11	493
HPV56	E7	10	51	HPV56	L1	8	162

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV56	L1	11	236	HPV56	L1	8	413
HPV56	L1	8	369	HPV56	L1	9	413
HPV56	L1	9	369	HPV56	L1	10	413
HPV56	L1	10	369	HPV56	L1	11	270
HPV56	L1	10	23	HPV56	L1	8	186
HPV56	L1	10	481	HPV56	L1	11	186
HPV56	L1	11	337	HPV56	L1	9	93
HPV56	L1	8	404	HPV56	L1	8	300
HPV56	L1	11	404	HPV56	L1	10	300
HPV56	L1	8	383	HPV56	L1	8	245
HPV56	L1	11	383	HPV56	L1	10	245
HPV56	L1	11	464	HPV56	L1	9	98
HPV56	L1	9	303	HPV56	L1	9	55
HPV56	L1	8	140	HPV56	L1	9	45
HPV56	L1	10	140	HPV56	L1	9	474
HPV56	L1	9	419	HPV56	L1	11	474
HPV56	L1	11	419	HPV56	L1	8	222
HPV56	L1	10	253	HPV56	L1	10	78
HPV56	L1	9	290	HPV56	L1	11	78
HPV56	L1	9	21	HPV56	L1	11	224
HPV56	L1	8	409	HPV56	L1	11	77
HPV56	L1	10	409	HPV56	L1	9	431
HPV56	L1	8	407	HPV56	L1	11	502
HPV56	L1	9	407	HPV56	L1	9	484
HPV56	L1	10	407	HPV56	L1	8	247
HPV56	L1	8	364	HPV56	L1	10	247
HPV56	L1	11	364	HPV56	L1	10	405
HPV56	L1	9	148	HPV56	L1	11	405
HPV56	L1	8	240	HPV56	L1	11	347
HPV56	L1	9	206	HPV56	L1	8	132
HPV56	L1	10	206	HPV56	L1	10	132
HPV56	L1	11	206	HPV56	L1	11	36
HPV56	L1	8	25	HPV56	L1	9	421
HPV56	L1	10	25	HPV56	L1	11	421
HPV56	L1	8	356	HPV56	L1	8	234
HPV56	L1	10	356	HPV56	L1	9	234
HPV56	L1	11	356	HPV56	L1	8	333
HPV56	L1	8	17	HPV56	L1	8	1
HPV56	L1	10	17	HPV56	L1	10	5
HPV56	L1	11	17	HPV56	L1	10	503
HPV56	L1	10	138	HPV56	L1	11	503
HPV56	L1	11	150	HPV56	L1	10	376
HPV56	L1	8	438	HPV56	L1	10	428
HPV56	L1	10	438	HPV56	L1	8	436
HPV56	L1	8	144	HPV56	L1	9	436
HPV56	L1	8	506	HPV56	L1	10	436
HPV56	L1	9	506	HPV56	L1	9	180
HPV56	L1	10	506	HPV56	L1	11	180
HPV56	L1	8	71	HPV56	L1	10	123
HPV56	L1	9	71	HPV56	L1	11	123
HPV56	L1	10	71	HPV56	L1	8	167
HPV56	L1	10	399	HPV56	L1	8	430
HPV56	L1	10	459	HPV56	L1	10	430
HPV56	L1	8	414	HPV56	L1	8	483
HPV56	L1	9	414	HPV56	L1	10	483
HPV56	L1	11	414	HPV56	L1	8	375
HPV56	L1	8	192	HPV56	L1	11	375
HPV56	L1	8	251	HPV56	L1	9	361
HPV56	L1	9	251	HPV56	L1	10	361
HPV56	L1	9	392	HPV56	L1	11	361

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV56	L1	9	91	HPV56 L1	8	520
HPV56	L1	11	91	HPV56 L1	10	520
HPV56	L1	9	226	HPV56 L1	10	100
HPV56	L1	10	226	HPV56 L1	11	67
HPV56	L1	9	28	HPV56 L1	9	446
HPV56	L1	10	28	HPV56 L1	9	332
HPV56	L1	11	28	HPV56 L1	11	279
HPV56	L1	10	172	HPV56 L1	9	261
HPV56	L1	8	197	HPV56 L1	11	261
HPV56	L1	11	197	HPV56 L1	9	489
HPV56	L1	11	511	HPV56 L1	8	373
HPV56	L1	8	228	HPV56 L1	9	373
HPV56	L1	10	228	HPV56 L1	10	373
HPV56	L1	8	31	HPV56 L1	9	182
HPV56	L1	10	473	HPV56 L1	11	182
HPV56	L1	9	221	HPV56 L1	9	86
HPV56	L1	8	255	HPV56 L1	11	86
HPV56	L1	9	155	HPV56 L1	11	323
HPV56	L1	11	146	HPV56 L1	11	380
HPV56	L1	8	496	HPV56 L1	8	304
HPV56	L1	10	496	HPV56 L1	9	377
HPV56	L1	8	13	HPV56 L1	8	415
HPV56	L1	10	13	HPV56 L1	10	415
HPV56	L1	11	4	HPV56 L1	9	188
HPV56	L1	8	467	HPV56 L1	11	188
HPV56	L1	9	467	HPV56 L1	11	212
HPV56	L1	8	50	HPV56 L1	8	215
HPV56	L1	9	50	HPV56 L1	9	215
HPV56	L1	10	50	HPV56 L1	10	215
HPV56	L1	8	522	HPV56 L1	11	215
HPV56	L1	8	52	HPV56 L1	8	370
HPV56	L1	8	189	HPV56 L1	9	370
HPV56	L1	10	189	HPV56 L1	11	370
HPV56	L1	11	189	HPV56 L1	9	366
HPV56	L1	9	410	HPV56 L1	11	366
HPV56	L1	11	410	HPV56 L1	10	57
HPV56	L1	11	288	HPV56 L1	8	326
HPV56	L1	9	339	HPV56 L1	9	326
HPV56	L1	9	362	HPV56 L1	10	326
HPV56	L1	10	362	HPV56 L1	9	513
HPV56	L1	9	504	HPV56 L1	11	513
HPV56	L1	10	504	HPV56 L1	9	173
HPV56	L1	11	504	HPV56 L1	11	173
HPV56	L1	10	384	HPV56 L1	9	246
HPV56	L1	10	187	HPV56 L1	11	246
HPV56	L1	10	213	HPV56 L1	8	420
HPV56	L1	11	213	HPV56 L1	10	420
HPV56	L1	8	297	HPV56 L1	11	259
HPV56	L1	9	297	HPV56 L1	8	87
HPV56	L1	11	297	HPV56 L1	10	87
HPV56	L1	9	349	HPV56 L1	9	214
HPV56	L1	10	159	HPV56 L1	10	214
HPV56	L1	11	159	HPV56 L1	11	214
HPV56	L1	10	110	HPV56 L1	10	365
HPV56	L1	9	131	HPV56 L1	8	56
HPV56	L1	11	131	HPV56 L1	11	56
HPV56	L1	8	65	HPV56 L1	8	367
HPV56	L1	9	272	HPV56 L1	10	367
HPV56	L1	8	417	HPV56 L1	11	367
HPV56	L1	11	417	HPV56 L1	8	134

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV56	L1	10	203	HPV56	L2	11	398
HPV56	L1	8	7	HPV56	L2	8	175
HPV56	L1	9	423	HPV56	L2	10	175
HPV56	L1	10	423	HPV56	L2	8	457
HPV56	L1	8	268	HPV56	L2	8	382
HPV56	L1	10	47	HPV56	L2	9	382
HPV56	L1	11	47	HPV56	L2	10	382
HPV56	L1	10	396	HPV56	L2	8	200
HPV56	L1	9	283	HPV56	L2	11	200
HPV56	L1	8	102	HPV56	L2	9	162
HPV56	L1	10	102	HPV56	L2	8	241
HPV56	L1	9	325	HPV56	L2	9	241
HPV56	L1	10	325	HPV56	L2	11	241
HPV56	L1	11	325	HPV56	L2	11	276
HPV56	L1	11	62	HPV56	L2	10	231
HPV56	L1	8	453	HPV56	L2	9	122
HPV56	L2	9	222	HPV56	L2	10	122
HPV56	L2	8	281	HPV56	L2	8	287
HPV56	L2	9	281	HPV56	L2	9	51
HPV56	L2	8	327	HPV56	L2	11	51
HPV56	L2	11	327	HPV56	L2	9	418
HPV56	L2	9	303	HPV56	L2	10	418
HPV56	L2	11	303	HPV56	L2	8	116
HPV56	L2	10	246	HPV56	L2	10	314
HPV56	L2	9	367	HPV56	L2	8	188
HPV56	L2	10	14	HPV56	L2	10	188
HPV56	L2	9	6	HPV56	L2	8	56
HPV56	L2	10	6	HPV56	L2	8	360
HPV56	L2	10	201	HPV56	L2	9	360
HPV56	L2	8	139	HPV56	L2	9	346
HPV56	L2	11	139	HPV56	L2	8	25
HPV56	L2	8	322	HPV56	L2	11	25
HPV56	L2	11	322	HPV56	L2	8	206
HPV56	L2	8	142	HPV56	L2	10	206
HPV56	L2	9	142	HPV56	L2	8	62
HPV56	L2	11	142	HPV56	L2	11	62
HPV56	L2	10	406	HPV56	L2	10	60
HPV56	L2	10	349	HPV56	L2	8	310
HPV56	L2	11	260	HPV56	L2	9	269
HPV56	L2	8	425	HPV56	L2	11	269
HPV56	L2	9	83	HPV56	L2	11	293
HPV56	L2	10	83	HPV56	L2	8	156
HPV56	L2	11	83	HPV56	L2	8	372
HPV56	L2	10	30	HPV56	L2	9	372
HPV56	L2	10	429	HPV56	L2	8	151
HPV56	L2	11	429	HPV56	L2	11	151
HPV56	L2	10	357	HPV56	L2	10	221
HPV56	L2	11	357	HPV56	L2	9	326
HPV56	L2	8	169	HPV56	L2	10	180
HPV56	L2	8	331	HPV56	L2	9	44
HPV56	L2	10	331	HPV56	L2	8	432
HPV56	L2	8	194	HPV56	L2	11	432
HPV56	L2	9	194	HPV56	L2	9	305
HPV56	L2	8	129	HPV56	L2	11	305
HPV56	L2	9	129	HPV56	L2	11	157
HPV56	L2	11	129	HPV56	L2	8	143
HPV56	L2	8	333	HPV56	L2	10	143
HPV56	L2	9	36	HPV56	L2	8	130
HPV56	L2	10	36	HPV56	L2	10	130
HPV56	L2	10	398	HPV56	L2	11	130

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV56	L2	8	279	HPV56	L2	10	73
HPV56	L2	10	279	HPV56	L2	8	420
HPV56	L2	11	279	HPV56	L2	11	420
HPV56	L2	11	81	HPV56	L2	10	171
HPV56	L2	9	407	HPV56	L2	11	171
HPV56	L2	10	103	HPV56	L2	8	98
HPV56	L2	11	103	HPV56	L2	9	98
HPV56	L2	9	91	HPV56	L2	10	98
HPV56	L2	8	229	HPV56	L2	10	410
HPV56	L2	9	229	HPV56	L2	11	185
HPV56	L2	10	302	HPV56	L2	8	145
HPV56	L2	8	34	HPV56	L2	11	145
HPV56	L2	11	34	HPV56	L2	8	166
HPV56	L2	8	43	HPV56	L2	11	166
HPV56	L2	10	43	HPV56	L2	10	328
HPV56	L2	10	22	HPV56	L2	11	328
HPV56	L2	11	22	HPV56	L2	8	16
HPV56	L2	8	19	HPV56	L2	11	16
HPV56	L2	8	38	HPV56	L2	9	232
HPV56	L2	8	235	HPV56	L2	11	232
HPV56	L2	8	263	HPV56	L2	10	198
HPV56	L2	9	263	HPV56	L2	9	172
HPV56	L2	9	181	HPV56	L2	10	172
HPV56	L2	11	337	HPV56	L2	11	172
HPV56	L2	8	45	HPV56	L2	8	306
HPV56	L2	8	106	HPV56	L2	10	306
HPV56	L2	8	248	HPV56	L2	8	233
HPV56	L2	11	197	HPV56	L2	10	233
HPV56	L2	9	353	HPV56	L2	10	11
HPV56	L2	8	179	HPV56	L2	8	5
HPV56	L2	11	179	HPV56	L2	10	5
HPV56	L2	9	278	HPV56	L2	11	5
HPV56	L2	11	278	HPV56	L2	11	220
HPV56	L2	9	385	HPV56	L2	11	452
HPV56	L2	9	388	HPV56	L2	8	298
HPV56	L2	8	239	HPV56	L2	10	298
HPV56	L2	9	239	HPV56	L2	10	225
HPV56	L2	10	239	HPV56	L2	8	316
HPV56	L2	11	239	HPV56	L2	11	316
HPV56	L2	10	285	HPV56	L2	10	250
HPV56	L2	8	86	HPV56	L2	10	370
HPV56	L2	11	86	HPV56	L2	11	370
HPV56	L2	11	245	HPV56	L2	9	339
HPV56	L2	9	138	HPV56	L2	8	13
HPV56	L2	8	325	HPV56	L2	11	13
HPV56	L2	10	325	HPV56	L2	11	102
HPV56	L2	10	374	HPV56	L2	9	262
HPV56	L2	8	214	HPV56	L2	10	262
HPV56	L2	9	214	HPV56	L2	9	49
HPV56	L2	10	214	HPV56	L2	11	49
HPV56	L2	10	90	HPV56	L2	9	363
HPV56	L2	8	254	HPV56	L2	11	363
HPV56	L2	10	254	HPV56	L2	8	154
HPV56	L2	11	254	HPV56	L2	10	154
HPV56	L2	8	160	HPV56	L2	9	79
HPV56	L2	9	160	HPV56	L2	9	378
HPV56	L2	11	160	HPV56	L2	10	378
HPV56	L2	8	392	HPV56	L2	10	212
HPV56	L2	8	73	HPV56	L2	11	212
HPV56	L2	9	73	HPV56	L2	8	134

Table VIII
HLA-A2 Supermotif-Bearing Peptides

HPV56	L2	10	134		HPV56	L2	10	71
HPV56	L2	11	134		HPV56	L2	11	71
HPV56	L2	8	148
HPV56	L2	10	148
HPV56	L2	11	148
HPV56	L2	9	365
HPV56	L2	11	365
HPV56	L2	9	95
HPV56	L2	10	95
HPV56	L2	11	95
HPV56	L2	9	111
HPV56	L2	10	390
HPV56	L2	8	304
HPV56	L2	10	304
HPV56	L2	8	80
HPV56	L2	8	379
HPV56	L2	9	379
HPV56	L2	11	379
HPV56	L2	8	105
HPV56	L2	9	105
HPV56	L2	9	247
HPV56	L2	9	15
HPV56	L2	8	386
HPV56	L2	11	386
HPV56	L2	8	136
HPV56	L2	9	136
HPV56	L2	11	136
HPV56	L2	9	135
HPV56	L2	10	135
HPV56	L2	9	149
HPV56	L2	10	149
HPV56	L2	11	2
HPV56	L2	9	280
HPV56	L2	10	280
HPV56	L2	8	270
HPV56	L2	10	270
HPV56	L2	11	270
HPV56	L2	8	366
HPV56	L2	10	366
HPV56	L2	10	167
HPV56	L2	8	112
HPV56	L2	10	140
HPV56	L2	11	140
HPV56	L2	8	408
HPV56	L2	8	389
HPV56	L2	11	389
HPV56	L2	11	236
HPV56	L2	9	104
HPV56	L2	10	104
HPV56	L2	8	84
HPV56	L2	9	84
HPV56	L2	10	84
HPV56	L2	8	92
HPV56	L2	9	31
HPV56	L2	11	31
HPV56	L2	11	40
HPV56	L2	8	351
HPV56	L2	11	351
HPV56	L2	8	431
HPV56	L2	9	431

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

2	3	4
L1	9	234
L2	10	329
L2	11	329
E5	8	9
E5	9	9
E5	10	9
E1	8	318
E1	10	318
L1	8	489
L1	10	489
L2	9	340
L2	11	340
E4	8	2
E4	10	2
E2	8	3
L2	8	286
L2	9	286
E2	8	72
E2	11	72
L2	10	112
L2	11	112
E1	11	112
L2	8	140
L2	11	140
L1	8	420
E1	8	475
E1	9	22
E1	11	22
E2	10	250
E1	8	65
E1	10	65
E4	9	14
E4	11	14
L2	8	228
L2	11	228
L1	11	81
L2	9	421
L2	10	421
E1	10	554
E1	11	554
E6	11	37
E5	8	79
E5	9	79
E5	11	79
E1	9	319
L1	9	203
L2	9	327
E1	10	63
L2	8	341
L2	10	341
L1	8	312
L1	10	300
E4	9	3
E4	11	3
E1	10	381
E2	11	217
L1	9	22
L1	11	22
E1	11	296

E1	10	407
E4	8	61
E4	9	61
L2	10	14
L2	11	14
E1	9	525
E1	11	525
E6	10	10
E6	8	86
E1	11	77
E1	10	101
L1	9	43
E2	10	231
L1	8	483
E1	8	601
E6	11	64
E1	11	234
E2	9	124
E2	10	124
L1	9	341
L1	11	341
E1	11	406
E1	10	473
E6	8	67
E6	9	137
E2	9	296
E2	8	35
E2	9	35
E1	8	488
E1	11	488
L1	9	153
E2	8	11
E7	9	71
E1	9	14
E1	10	14
E1	11	14
L1	8	171
E6	8	131
E2	8	252
E6	8	31
E6	9	31
E6	10	31
E6	11	31
E1	9	640
E1	10	640
E4	10	64
E4	11	64
E2	8	9
E2	10	9
E2	8	153
E1	10	516
E1	11	516
E1	8	524
E1	10	524
E2	11	230
L1	9	24
E1	8	369
E1	9	369
E1	8	170
E1	10	170

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

L2	9	278		E1	8	71
L2	10	278		E1	9	71
L2	11	278		E1	9	178
E6	11	96		E2	8	174
L2	9	356		L2	9	274
L2	10	356		E1	10	250
E7	8	75		E1	8	143
E7	9	75		E2	9	2
E7	10	75		E1	8	21
L2	8	322		E1	10	21
L2	9	322		E2	8	66
L2	9	404		E2	10	66
L2	11	404		L2	8	173
E1	11	570		L2	10	173
E7	8	88		E1	10	336
E7	11	88		E1	11	336
L2	11	347		E1	11	180
L2	10	396		E1	11	62
L2	11	396		L1	11	299
E1	11	222		E1	11	100
E2	10	313		L2	8	332
L1	8	366		L2	9	332
L1	11	366		L2	10	332
E7	8	14		L2	8	192
E7	10	14		L2	9	192
L1	9	208		E1	8	105
L1	11	208		E1	9	105
E1	11	46		E1	11	105
L1	9	195		L2	11	120
L1	10	195		E6	10	42
L2	9	42		E1	8	197
L2	11	42		E1	10	197
E6	9	14		E1	11	197
E6	11	14		E2	8	17
L1	10	455		E2	10	17
L1	11	455		L2	8	334
E2	8	141		E2	9	74
E2	11	141		E2	10	74
L1	10	198		E1	11	417
E1	9	481		E1	11	360
E1	11	481		E7	11	27
E1	10	73		E2	9	341
L1	8	331		E2	10	341
L1	9	331		E7	10	73
L1	10	331		E7	11	73
L2	10	369		E6	9	92
L2	11	369		E6	10	92
E1	8	534		E6	11	92
L1	10	411		E2	9	96
L1	11	411		L2	8	135
L2	10	30		L2	10	135
L2	11	30		E4	8	75
E6	8	99		E4	9	75
L1	9	215		E4	10	75
L1	10	215		E4	11	75
L2	11	258		E2	8	185
L2	8	143		E2	9	185
L2	9	143		E7	10	39
L2	10	143		E1	8	141
E2	11	136		E1	10	141

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

Protein	Length	Position		Protein	Length	Position
E1	9	39		L2	10	129
E1	10	39		L2	11	198
E6	8	113		E2	11	171
E6	9	113		E5	8	28
E6	10	113		E5	10	28
L1	9	262		L1	8	326
L1	10	262		L1	11	326
L1	11	262		E5	8	24
L1	8	103		E5	9	24
L1	10	103		E5	10	24
E2	8	118		E5	11	24
E2	11	118		L1	8	202
L1	8	381		L1	10	202
L1	9	381		L2	9	117
E7	9	78		L2	10	314
E7	10	78		L1	8	318
E2	8	205		L1	10	318
E2	9	205		L1	11	318
E2	11	205		L2	8	58
E5	8	2		E1	9	243
E5	9	2		E1	11	194
E5	11	2		E1	8	326
L1	11	206		E1	9	326
L1	8	80		E2	11	156
L1	9	252		E1	9	350
L2	9	442		E1	10	350
L2	11	442		L1	10	101
E1	8	50		L2	10	56
L1	8	369		E7	8	22
L1	9	369		E7	9	22
L1	10	369		E1	8	217
E1	10	454		E2	9	50
L2	9	428		E2	10	50
E5	8	40		L1	9	400
E5	9	40		L1	10	400
E5	10	40		L2	8	292
E5	11	40		L2	10	223
E1	10	494		L1	9	144
L1	8	119		L1	11	144
E1	8	393		E2	8	55
E1	11	393		E2	10	55
E2	10	346		E1	8	273
E2	11	346		L1	8	136
L2	8	398		L1	10	136
L2	9	398		E1	10	162
E1	10	446		E2	8	162
L1	9	245		E2	11	162
E1	9	457		L1	8	107
L2	8	239		L2	8	300
L2	9	239		E1	8	191
L2	10	239		E1	9	191
L2	11	276		L2	8	215
E1	11	18		L2	10	215
E2	8	290		L2	8	25
E1	8	252		L2	11	25
E1	10	252		E1	10	6
L1	8	371		L2	9	64
L1	10	371		L2	11	64
L2	8	129		E1	8	436
L2	9	129		E1	9	436

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

L2	10	60		L2	11	149
E1	11	145		L1	10	361
E7	9	85		E2	8	29
E7	11	85		E1	10	502
L1	10	407		E7	8	5
L2	8	413		E7	9	5
L2	9	413		E7	11	5
L2	10	413		E5	8	8
E1	8	467		E5	9	8
E1	9	467		E5	10	8
E1	10	467		E5	11	8
E1	11	467		L2	11	40
E1.	9	147		E1	9	98
L2	8	75		E5	8	22
L2	9	75		E5	10	22
L1	10	222		E5	11	22
E5	8	11		E1	9	474
E5	10	11		L2	8	326
E5	11	11		L2	10	326
E4	8	90		L2	8	287
E4	10	90		E5	9	21
E1	10	316		E5	11	21
L2	9	51		L1	9	272
L2	11	51		L1	11	272
L1	10	111		E5	11	31
L1	10	478		L2	9	113
E2	9	242		L2	10	113
E2	10	242		L2	8	279
L1	8	113		L2	9	279
E1	9	415		L2	10	279
E1	8	189		E6	10	97
E1	10	189		L2	10	141
E1	11	189		L2	11	141
L1	8	35		E1	10	195
L1	9	35		L2	8	178
L1	10	35		L2	9	178
E2	10	53		E5	10	32
L2	8	177		E5	11	32
L2	9	177		L2	9	44
L2	10	177		E5	9	17
E6	9	119		E5	10	17
E6	11	119		E6	8	120
E1	8	264		E6	10	120
E1	11	264		L1	9	191
E4	10	59		E1	8	313
E4	11	59		E1	10	265
E2	8	78		E1	11	265
E2	9	310		L2	8	405
E1	10	449		L2	10	405
E2	11	274		L2	8	429
L2	9	230		L2	11	429
L2	11	230		E1	8	56
E1	8	176		E1	10	56
E1	11	176		E1	11	56
E6	8	25		E1	10	571
L1	8	387		L1	8	376
E4	10	26		L1	9	376
L2	8	306		L1	11	376
L2	10	306		E1	11	341
E1	8	581		L2	11	82

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

L2	9	185		L1	11	148
L2	11	185		E2	10	182
L2	8	131		E2	11	182
L2	10	131		E1	11	424
L2	11	131		E2	10	84
L1	10	187		E2	11	84
L1	11	187		E6	9	18
E4	9	83		E6	10	18
E4	10	83		E4	8	42
E4	11	83		E1	8	231
E7	10	89		E1	9	231
E7	11	11		E1	10	231
L2	10	121		E2	11	115
L2	11	121		E2	8	165
E1	10	443		E2	11	165
E2	11	287		E1	8	518
E1	8	23		E1	9	518
E1	10	23		L2	8	34
L2	9	104		L2	11	34
L2	10	104		E2	8	147
L2	11	104		E2	11	147
E5	8	34		E6	9	116
E5	9	34		B1	9	121
E5	11	34		E6	11	52
E5	8	41		E1	8	283
E5	9	41		E1	9	283
E5	10	41		E1	10	283
E5	11	41		E2	10	63
E2	10	45		E2	11	63
E1	11	553		L1	9	61
E2	8	325		L1	9	19
E2	9	325		L1	10	19
E2	10	325		L1	11	71
E2	11	325		E1	8	351
L1	9	311		E1	9	351
E6	10	123		E1	11	351
L1	11	486		E4	10	13
E1	11	433		B4	9	60
E6	11	73		E4	10	60
E2	10	351		L1	10	42
E1	8	312		L2	8	107
E1	9	312		L2	10	107
E2	9	359		E1	9	255
E2	10	359		E1	11	255
E1	8	254		E1	11	307
E1	10	254		L1	10	271
E6	11	128		E1	8	557
E1	9	357		E1	9	557
L2	10	22		E1	10	557
L2	11	22		E5	8	16
E1	9	114		E5	10	16
E1	8	420		E5	11	16
L1	8	169		E6	11	101
L1	10	169		E1	10	223
E6	8	94		E1	11	223
E6	9	94		L2	8	179
E7	8	49		E1	8	491
E2	8	47		E1	9	491
E2	10	47		E1	10	491
L1	8	148		E2	9	314

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

L1	11	186		L1	11	465
L2	8	246		L1	8	209
E5	9	33		L1	10	209
E5	10	33		E1	11	132
L1	11	41		E1	8	358
E1	11	521		L2	9	23
E1	9	540		L2	10	23
E2	10	15		B4	11	81
E1	11	208		E6	9	121
E7	8	83		E1	9	555
E7	11	83		E1	10	555
E4	8	8		E1	11	555
E1	9	198		E5	8	49
E1	10	198		E5	9	49
E1	11	198		E5	11	49
E2	8	82		E5	10	70
E7	8	82		E5	11	70
E7	9	82		E1	8	268
E5	11	59		E1	9	268
E5	8	55		E1	10	268
E5	9	55		E1	11	268
E5	11	55		E1	8	115
E5	9	51		L2	8	372
E5	10	51		L2	9	372
E5	11	51		B6	10	38
E1	9	298		E5	9	61
E1	10	298		E5	10	61
E1	11	298		E5	11	61
E5	11	69		L2	8	338
E5	10	60		L2	11	338
E5	11	60		E5	8	73
E5	8	72		E5	10	73
E5	9	72		E1	8	514
E5	11	72		E1	9	514
E1	9	276		E7	9	29
E1	9	563		E5	9	47
E1	10	563		E5	10	47
E5	8	56		E5	11	47
E5	10	56		E1	8	277
E2	8	42		L1	8	295
E2	10	42		E1	8	564
E5	8	52		E1	9	564
E5	9	52		E7	8	67
E5	10	52		E7	10	67
E5	11	52		L1	8	95
E2	8	94		L1	10	95
E2	11	94		L1	10	233
E5	8	65		E4	8	1
E5	9	65		E4	9	1
E5	10	65		E4	11	1
L1	10	367		L2	8	87
L1	11	367		L2	11	87
E6	11	27		L1	11	383
L1	11	309		E1	8	306
E1	9	511		E1	10	398
E1	10	511		E1	11	398
E1	11	511		E2	8	75
E7	9	15		E2	9	75
L2	8	399		E2	11	75
L2	11	399		E2	9	56

194

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

L1	8	338		L1	9	142
L1	9	338		L1	11	142
E2	10	151		E7	9	64
E1	10	47		E7	11	64
E1	11	47		E2	8	348
L1	8	196		E2	9	348
L1	9	196		L2	10	237
E1	10	19		L2	11	237
L1	8	154		L2	8	124
E1	11	274		L2	9	124
E1	10	361		L2	9	285
L2	8	115		L2	10	285
L2	11	115		L2	8	139
E2	9	71		L2	9	139
E2	8	249		E5	9	78
E2	11	249		E5	10	78
E6	8	36		E2	8	216
E1	11	607		E2	8	196
L2	8	270		E2	11	196
L2	10	270		L1	8	482
L2	11	270		L1	9	482
E1	10	389		L2	9	325
E6	8	5		L2	11	325
E6	9	5		L1	8	217
E1	9	329		L2	9	189
E1	9	600		L2	11	189
E1	8	270		E1	8	94
E1	9	270		E1	9	94
E1	10	270		E1	11	442
E1	11	270		E6	8	110
E1	8	451		E6	11	110
L1	11	31		E4	10	34
E1	8	300		L1	8	183
E1	9	300		L1	9	183
L2	8	366		L2	8	451
L2	10	366		L2	9	451
E1	9	55		L1	8	458
E1	11	55		L2	10	73
L1	10	445		L2	11	73
E1	8	539		E7	8	47
E1	10	539		E7	9	47
L1	9	438		E7	10	47
E6	9	21		E1	8	562
E1	11	397		E1	10	562
L1	8	337		E1	11	562
L1	9	337		E5	8	64
L1	10	337		E5	9	64
L1	8	323		E5	10	64
L1	10	323		E5	11	64
L1	11	323		E1	8	258
E1	10	304		E1	11	258
E6	9	75		L2	9	389
L2	8	38		L2	11	389
E1	11	96		L2	9	337
E2	9	127		E1	8	513
E2	11	127		E1	9	513
L1	8	289		E1	10	513
L2	9	385		L2	8	86
L2	10	377		L2	9	86
L2	11	377		L2	9	411

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

L2	10	411	L1	9	419
L2	11	411	E1	9	399
E1	10	545	E1	10	399
E1	11	545	E1	11	399
L2	11	168	E1	9	64
L2	11	243	E1	11	64
L2	8	423	E5	9	7
E2	10	354	E5	10	7
L2	8	183	E5	11	7
L2	11	183	L2	8	43
E4	8	67	L2	10	43
E4	10	67	E6	10	28
E4	11	67	E6	11	28
E1	9	182	E1	10	31
E1	11	182	E6	8	15
L2	9	359	E6	10	15
L2	10	207	L1	8	151
L2	11	207	L1	11	151
L1	9	90	L1	9	372
L1	11	90	L1	11	372
L2	9	96	L1	9	301
L2	10	96	L1	9	324
E2	9	258	L1	10	324
E2	10	258	E2	11	14
E2	11	258	E7	9	81
L2	8	171	E7	10	81
L2	9	171	E7	10	28
L2	10	171	L2	8	16
L2	11	426	L2	9	16
L2	8	158	L2	11	16
L2	9	158	E4	8	4
E7	10	20	E4	10	4
E7	11	20	E4	11	4
E5	8	19	L1	11	232
E5	11	19	L1	11	250
L1	8	266	E2	9	48
L2	11	212	E2	11	48
L1	10	175	E2	8	76
E5	8	5	E2	10	76
E5	9	5	E1	9	305
E5	11	5	E2	9	344
L1	8	16	E7	8	80
L1	10	16	E7	10	80
E2	10	222	E7	11	80
E2	11	222	E2	8	244
L2	10	418	E2	10	244
L2	8	363	E2	11	244
L2	10	363	L2	8	19
L2	11	363	L1	9	210
L2	8	91	L1	11	210
L2	8	252	E2	8	233
L2	10	252	E2	11	233
L2	8	328	L1	10	149
L2	11	328	E2	10	218
E1	9	636	E1	8	344
E1	10	636	E1	9	344
E1	11	636	L2	8	231
L1	8	177	L2	10	231
L1	10	177	L2	8	233
L1	11	177	L2	10	233

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

E2	8	57	L2	8	111
E2	11	57	L2	11	111
E1	8	391	L2	11	77
E1	10	391	E6	8	3
L1	9	259	E6	9	3
L2	8	227	E6	10	3
L2	9	227	E6	11	3
L1	10	53	L2	10	181
L2	8	5	L2	8	13
L2	10	5	L2	11	13
L2	11	5	E6	8	9
L2	10	11	E6	11	9
L2	8	298	E1	8	547
L2	10	298	E1	9	547
L2	8	316	E1	10	547
L2	11	316	E1	11	547
L2	9	449	L2	9	153
L2	10	449	L2	9	267
L2	11	449	L2	11	267
E2	9	7	E5	8	30
E2	10	7	L1	8	50
E1	8	109	L1	9	50
L1	11	241	L1	10	50
E1	8	125	E2	9	207
E1	9	125	E2	11	207
L2	8	281	L2	8	392
L2	9	245	L1	10	474
E2	9	303	L1	11	474
E1	8	616	E1	9	247
E7	9	66	E1	10	247
E7	11	66	L1	8	375
L1	9	94	L1	9	375
L1	11	94	L1	10	375
E1	9	69	L2	8	81
E1	10	69	L2	10	103
E1	11	69	L2	11	103
E1	10	117	L1	11	285
E2	8	343	L1	10	86
E2	10	343	L1	11	86
E1	9	343	L2	9	49
E1	10	343	L2	11	49
E1	9	324	L2	8	106
E1	10	324	L2	9	106
E1	11	324	L2	11	106
L1	8	476	E1	9	490
L1	9	476	E1	10	490
L2	9	68	E1	11	490
L2	11	68	E2	9	81
E1	9	293	E4	8	80
L1	8	29	L1	9	294
L1	8	279	E1	9	260
L1	10	279	E1	10	260
L2	8	221	E2	10	88
L2	9	221	E6	10	23
L1	11	140	L2	10	304
L1	9	488	E2	8	150
L1	11	488	E2	11	150
L1	8	379	E1	10	635
L1	10	379	E1	11	635
L1	11	379	L1	10	418

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

E1	8	354		E1	10	97
E1	9	354		E6	8	12
E7	10	45		E6	11	12
E7	11	45		E2	9	355
E2	8	23		E2	11	355
E2	9	23		L2	10	184
E4	8	86		L2	8	130
E4	9	86		L2	9	130
E4	10	86		L2	11	130
E5	8	14		E4	10	82
E5	9	14		E4	11	82
E5	10	14		E1	8	294
L1	8	335		L1	8	339
L1	10	335		L1	11	339
L1	11	335		E7	8	86
L2	8	241		E7	10	86
L2	8	210		E4	9	68
E2	8	220		E4	10	68
E2	9	226		E4	11	68
E6	10	7		L1	9	408
E2	8	201		L1	11	270
E2	9	211		E1	8	556
E2	11	211		E1	9	556
E1	8	289		E1	10	556
E1	9	289		E1	11	556
E1	10	289		E5	8	15
E1	11	289		E5	9	15
E2	8	190		E5	11	15
E2	10	190		E7	9	7
E1	11	331		E5	8	50
L1	11	7		E5	10	50
E2	10	317		E5	11	50
L1	8	281		E1	10	297
L1	10	281		E1	11	297
L1	8	189		E5	9	71
L1	9	189		E5	10	71
L1	11	189		E2	9	93
L1	10	392		L1	8	377
E2	10	40		L1	10	377
E5	8	45		E1	9	408
E5	9	45		E1	11	408
E5	11	45		E2	8	128
L2	9	260		E2	10	128
E1	8	185		E2	8	227
E1	9	185		E2	10	203
E1	11	185		E2	11	203
E2	9	198		L2	8	360
E2	11	198		L2	11	360
L2	9	164		E1	11	30
L2	11	164		L1	9	150
L2	8	145		L2	9	15
L2	10	145		L2	10	15
L1	9	343		E1	8	526
E6	8	40		E1	10	526
E1	8	192		L2	9	166
L2	8	420		L2	8	380
L2	10	420		L2	9	380
L2	11	420		L2	11	380
L2	11	409		L1	9	92
L2	9	216		L1	11	92

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

E1	8	148		L2	10	378
E6	9	39		L2	11	378
E1	8	232		E4	8	92
E1	9	232		L1	9	328
L1	9	223		L1	11	328
L1	11	223		L1	10	8
E6	8	142		E1	9	317
E6	9	11		E1	11	317
L2	8	137		L2	10	339
L2	10	137		E1	10	239
L2	11	137		E1	8	519
E5	8	62		L2	8	97
E5	9	62		L2	9	97
E5	10	62		L2	11	97
E5	11	62		E1	8	291
E2	11	202		E1	9	291
L1	8	91		E1	11	291
L1	10	91		L1	8	21
L1	8	332		L1	10	21
L1	9	332		E2	8	192
L1	11	332		E2	11	192
L2	9	151		E1	9	333
L2	11	151		E1	10	333
E4	8	77		E5	10	20
E4	9	77		L2	9	31
E4	11	77		L2	10	31
E4	8	84		L2	11	31
E4	9	84		L1	8	190
E4	10	84		L1	10	190
E4	11	84		L2	10	199
E5	9	12		E7	10	12
E5	10	12		L1	9	393
E5	11	12		E6	10	53
L2	9	136		E6	11	53
L2	11	136		E4	8	7
L2	10	150		E4	9	7
E4	8	76		E1	10	275
E4	9	76		E2	9	41
E4	10	76		E2	11	41
E6	11	87		L1	9	73
L2	8	386		L1	10	73
E4	9	91		E5	8	48
E2	8	212		E5	9	48
E2	10	212		E5	10	48
E1	8	290		E5	8	46
E1	9	290		E5	10	46
E1	10	290		E5	11	46
E6	10	88		L1	8	382
E6	11	88		L1	9	176
E4	9	73		L1	11	176
E4	10	73		E7	8	69
E4	11	73		E7	11	69
E2	10	116		E1	9	79
E2	9	191		E2	8	139
E1	8	345		E2	10	139
E1	10	332		E1	9	444
E1	11	332		E2	10	288
L2	11	387		L2	8	261
E1	10	78		L2	11	261
L2	9	378		E1	9	24

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

E5	8	6		E1	11	464
E5	10	6		E5	8	58
E5	11	6		E1	8	510
E7	8	79		E1	10	510
E7	9	79		E1	11	510
E7	11	79		E1	8	267
E2	8	243		E1	9	267
E2	9	243		E1	10	267
E2	11	243		E1	11	267
E2	9	232		E2	9	134
L2	9	232		E2	10	92
L2	11	232		E6	8	141
E1	9	362		E6	9	141
L2	9	419		E4	10	72
L2	11	419		E4	11	72
E7	11	55		E2	8	145
L2	9	234		E2	10	145
E7	8	6		E1	8	237
E7	10	6		E6	8	61
L2	9	364		L2	9	349
L2	10	364		E6	8	82
L2	8	165		E1	8	262
L2	10	165		E1	10	262
L2	8	379		E1	11	380
L2	9	379		E6	9	85
L2	10	379		E6	8	46
L1	10	27		E6	9	46
L2	9	146		E5	9	81
E1	8	565		L1	9	385
L1	8	344		L1	10	385
L1	10	327		E4	11	12
E1	11	238		E6	10	105
L1	8	20		E1	10	86
L1	9	20		L2	9	435
L1	11	20		E1	8	579
E5	8	25		E1	10	579
E5	9	25		E5	8	54
E5	10	25		E5	9	54
E5	11	25		E5	10	54
L1	8	329		L2	8	371
L1	10	329		L2	9	371
L1	11	329		L2	10	371
E2	8	349		E1	9	532
L1	10	72		E1	10	532
L1	11	72		L1	10	358
E2	10	58		E1	11	536
E5	8	3		L2	9	18
E5	10	3		L1	8	65
E5	11	3		L1	9	65
E7	9	68		L1	10	65
E2	8	132		E2	8	159
E2	11	132		E2	11	159
L1	8	97		L1	10	350
E2	11	321		E2	8	214
E1	9	426		E2	10	214
E5	9	36		E5	8	43
E5	11	36		E5	9	43
E1	8	340		E5	10	43
E1	8	530		E5	11	43
E1	11	530		E1	8	402

Table VIIIA HPV 6A
HLA-A2 Supermotif Peptides

E4	8	6
E4	9	6
E4	10	6
E2	8	168
L1	9	287
L1	10	287
L2	8	71
L1	8	10
L1	11	10
E2	9	138
E2	11	138
L1	8	415
E1	8	91
E1	9	91
E1	11	91
L1	11	26
E2	9	131

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

2	3	4		2	3	4
L1	9	234		E4	8	71
L2	10	329		E4	9	71
L2	11	329		L2	10	14
E5A	9	9		L2	11	14
E5A	10	9		E1	9	525
E1	8	318		E1	11	525
E1	10	318		E6	10	10
L1	8	489		E6	8	86
L1	10	489		E1	11	77
L2	9	340		E1	10	101
L2	11	340		L1	9	43
E4	8	12		E5B	8	36
E4	10	12		E2	10	231
E2	8	3		L1	8	483
L2	8	286		E1	8	601
L2	9	286		E6	11	64
E2	8	72		E5B	8	20
E2	11	72		E5B	10	20
L2	10	112		E5B	11	20
L2	11	112		E2	9	124
E1	11	112		E2	10	124
L2	8	140		L1	9	341
L2	11	140		L1	11	341
L1	8	420		E1	11	406
E1	8	475		E1	10	473
E1	9	22		E1	11	234
E1	11	22		E6	8	67
E2	10	250		E6	9	137
E1	8	65		E2	9	296
E1	10	65		E2	8	35
E4	9	24		E2	9	35
E4	11	24		E1	8	488
L2	8	228		E1	11	488
L2	11	228		L1	9	153
L1	11	81		E2	8	11
L2	9	421		E5B	8	5
L2	10	421		E5B	10	5
E1	10	554		E7	9	71
E1	11	554		E1	9	14
E6	11	37		E1	10	14
E5A	8	79		E1	11	14
E5A	9	79		L1	8	171
E5A	10	79		E6	8	131
E5A	11	79		E2	8	252
E1	9	319		E6	8	31
L1	9	203		E6	9	31
L2	9	327		E6	10	31
E1	10	63		E6	11	31
L2	8	341		E1	9	640
L2	10	341		E1	10	640
L1	8	312		E4	10	74
L1	10	300		E4	11	74
E4	9	13		E2	8	9
E4	11	13		E2	10	9
E1	10	381		E2	8	153
E2	11	217		E1	10	516
L1	9	22		E1	11	516
L1	11	22		E1	8	524
E1	11	296		E1	10	524
E1	10	407		E2	11	230
				L1	9	24

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

E1	8	369		L2	10	143
E1	9	369		E2	8	348
E1	8	170		E2	9	348
E1	10	170		E2	9	136
L2	9	278		E2	11	136
L2	10	278		E1	8	71
L2	11	278		E1	9	71
E6	11	96		E1	9	178
E7	8	75		E2	8	174
E7	9	75		L2	9	274
E7	10	75		E1	10	250
L2	8	322		E1	8	143
L2	9	322		E2	9	2
L2	9	403		E1	8	21
L2	11	403		E1	10	21
E1	11	570		E2	8	66
L2	11	347		E2	10	66
L2	10	395		L2	8	173
L2	11	395		L2	10	173
E1	11	222		E1	10	336
E2	10	313		E1	11	336
L1	8	366		E1	11	180
L1	11	366		E1	11	62
E7	8	14		L1	11	299
E7	10	14		E1	11	100
L1	9	208		L2	8	332
L1	11	208		L2	9	332
E1	11	46		L2	10	332
L1	9	195		L2	8	192
L1	10	195		L2	9	192
L2	9	42		E1	8	105
L2	11	42		E1	9	105
E6	9	14		E1	11	105
E6	11	14		L2	11	120
L1	10	455		E6	10	42
L1	11	455		E1	8	197
L1	10	198		E1	10	197
E1	9	481		E1	11	197
E1	11	481		E2	8	17
E1	10	73		E2	10	17
L1	8	331		L2	8	334
L1	9	331		E2	9	74
L1	10	331		E2	10	74
E5B	8	11		E1	11	417
E5B	9	11		E1	11	360
E5B	11	11		E7	11	27
E2	9	143		E2	9	341
E2	10	143		E2	10	341
L2	10	369		E7	10	73
L2	11	369		E7	11	73
E1	8	534		E6	9	92
L1	10	411		E6	10	92
L1	11	411		E6	11	92
L2	10	30		E2	9	96
L2	11	30		L2	8	135
E6	8	99		L2	10	135
L1	9	215		E4	8	85
L1	10	215		E4	9	85
L2	11	258		E4	10	85
L2	8	143		E4	11	85
L2	9	143		E2	8	185

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

E2	9	185		E1	9	457
E7	10	39		L2	11	276
E1	8	141		E1	11	18
E1	10	141		E2	8	290
E1	9	39		E1	8	252
E1	10	39		E1	10	252
E6	8	113		L1	8	371
E6	9	113		L1	10	371
E6	10	113		L2	8	129
L1	9	262		L2	9	129
L1	10	262		L2	10	129
L1	11	262		E2	11	171
L1	8	103		E5A	8	28
L1	10	103		E5A	10	28
E2	8	118		L1	8	326
E2	11	118		L1	11	326
L1	8	381		E5A	8	24
L1	9	381		E5A	9	24
E7	9	78		E5A	10	24
E7	10	78		E5A	11	24
E2	8	205		L2	11	198
E2	9	205		L1	8	202
E2	11	205		L1	10	202
E5A	8	2		L2	9	117
E5A	9	2		E4	9	2
E5A	11	2		E4	10	2
L1	11	206		E4	11	2
L1	8	80		L2	10	314
L1	9	252		L1	8	318
L2	9	442		L1	10	318
L2	11	442		L1	11	318
E1	8	50		L2	8	58
L1	8	369		E1	9	243
L1	9	369		E1	11	194
L1	10	369		L2	9	356
E5A	8	16		L2	10	356
E5A	10	16		E1	8	326
E5A	11	16		E1	9	326
E1	10	454		E2	11	156
L2	9	428		E1	9	350
E5B	8	22		E1	10	350
E5B	9	22		L1	10	101
E5B	10	22		L2	10	56
E5B	11	22		E7	8	22
E5A	8	40		E7	9	22
E5A	9	40		E5B	9	28
E5A	10	40		E5B	10	28
E5A	11	40		E1	8	217
E2	10	346		E2	9	50
E2	11	346		E2	10	50
E1	10	494		L1	9	400
L1	8	119		L1	10	400
E1	8	393		L2	8	292
E1	11	393		E5B	9	15
L2	8	397		E5B	10	15
L2	9	397		L2	10	223
E1	10	446		L1	9	144
L1	9	245		L1	11	144
L2	8	239		E5B	8	25
L2	9	239		E2	8	55
L2	10	239		E2	10	55

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

E1	8	273	E2	8	78
L1	8	136	E2	9	310
L1	10	136	E1	10	449
E1	10	162	E1	11	449
E2	8	162	E2	11	274
E2	11	162	L2	9	230
L1	8	107	L2	11	230
L2	8	300	E1	8	176
E1	8	191	E1	11	176
E1	9	191	E6	8	25
L2	8	215	L1	8	387
L2	10	215	E4	10	36
L2	8	25	L2	8	306
L2	11	25	L2	10	306
E1	10	6	E1	8	581
L2	9	64	L2	11	149
L2	11	64	L1	10	361
E1	8	436	E2	8	29
E1	9	436	E1	10	502
L2	10	60	E7	8	5
E1	11	145	E7	9	5
L1	10	407	E7	11	5
E7	9	85	E5A	8	8
E7	11	85	E5A	10	8
L2	8	412	E5A	11	8
L2	10	412	L2	11	40
L2	11	412	E1	9	98
E1	8	467	E5A	8	22
E1	9	467	E5A	10	22
E1	10	467	E5A	11	22
E1	11	467	E1	9	474
E1	9	147	L2	8	326
L1	10	222	L2	10	326
E5A	8	11	L2	8	287
E5A	10	11	E5A	9	21
E5A	11	11	E5A	11	21
E4	8	100	L1	9	272
E4	10	100	L1	11	272
E1	10	316	E5A	11	31
L2	9	51	L2	9	113
L2	11	51	L2	10	113
L1	10	111	L2	8	279
L1	10	478	L2	9	279
E2	9	242	L2	10	279
E2	10	242	E6	10	97
L1	8	113	L2	10	141
E1	9	415	L2	11	141
E1	8	189	E1	10	195
E1	10	189	L2	8	178
E1	11	189	L2	9	178
L1	8	35	E5A	10	32
L1	9	35	E5A	11	32
L1	10	35	L2	9	44
E2	10	53	E5A	9	17
L2	8	177	E5A	10	17
L2	9	177	E6	8	120
L2	10	177	E6	10	120
E6	9	119	L1	9	191
E6	11	119	E1	8	313
E1	8	264	E1	10	265
E1	11	264	E1	11	265

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

L2	8	404		E1	9	357
L2	10	404		L2	10	22
L2	8	429		L2	11	22
L2	11	429		E1	9	114
E1	8	56		E1	8	420
E1	10	56		L1	8	169
E1	11	56		L1	10	169
E1	10	571		E6	8	94
L1	8	376		E6	9	94
L1	9	376		E7	8	49
L1	11	376		E2	8	47
E1	11	341		E2	10	47
L2	11	82		L1	8	148
L2	8	131		L1	11	148
L2	10	131		E1	11	424
L2	11	131		E6	9	18
L1	10	187		E6	10	18
L1	11	187		E4	8	52
E4	9	93		E1	8	231
E4	10	93		E1	9	231
E4	11	93		E1	10	231
E7	10	89		E2	11	115
E5B	8	23		E2	8	165
E5B	9	23		E2	11	165
E5B	10	23		E1	8	518
E7	11	11		E1	9	518
L2	10	121		L2	8	34
L2	11	121		L2	11	34
E1	10	443		E2	8	147
E2	11	287		E2	11	147
E1	8	23		E6	9	116
E1	10	23		E1	9	121
L2	9	104		E6	11	52
L2	10	104		E1	8	283
L2	11	104		E1	9	283
E5A	8	34		E1	10	283
E5A	9	34		E2	10	63
E5A	11	34		E2	11	63
E5A	8	41		L1	9	61
E5A	9	41		L1	9	19
E5A	10	41		L1	10	19
E5A	11	41		L1	11	71
E2	10	45		E1	8	351
E1	11	553		E1	9	351
E2	8	325		E1	11	351
E2	9	325		E4	10	23
E2	10	325		E4	9	70
E2	11	325		E4	10	70
L1	9	311		L1	10	42
E6	10	123		L2	8	107
L1	11	486		L2	10	107
E1	11	433		E1	9	255
E6	11	73		E1	11	255
E2	10	351		E1	11	307
E1	8	312		L1	10	271
E1	9	312		E1	8	557
E2	9	359		E1	9	557
E2	10	359		E1	10	557
E1	8	254		E6	11	101
E1	10	254		E1	10	223
E6	11	128		E1	11	223

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

L2	8	179		L1	11	367
E1	8	491		E6	11	27
E1	9	491		L1	11	309
E1	10	491		E1	9	511
E2	9	314		E1	10	511
L1	11	186		E1	11	511
L2	8	246		E7	9	15
E5A	9	33		L2	8	398
E5A	10	33		L2	11	398
L1	11	41		L1	11	465
E5B	9	18		L1	8	209
E5B	10	18		L1	10	209
E1	11	521		L2	9	74
E1	9	540		L2	10	74
E2	10	15		E5B	10	3
E1	11	208		E1	11	132
E7	8	83		E1	8	358
E7	11	83		L2	9	23
E4	8	18		L2	10	23
E1	9	198		E4	11	91
E1	10	198		E6	9	121
E1	11	198		E1	8	458
E7	8	82		E1	11	458
E7	9	82		E1	9	555
E5B	8	29		E1	10	555
E5B	9	29		E1	11	555
E5A	11	59		E5A	8	49
E5A	8	55		E5A	9	49
E5A	9	55		E5A	11	49
E5A	11	55		E5A	10	70
E5A	9	51		E5A	11	70
E5A	10	51		E1	8	268
E5A	11	51		E1	9	268
E5B	8	30		E1	10	268
E1	9	298		E1	11	268
E1	10	298		E1	8	115
E1	11	298		L2	8	372
E2	8	82		L2	9	372
E5A	11	69		E6	10	38
E5A	10	60		E5A	9	61
E5A	11	60		E5A	10	61
E5A	8	72		E5A	11	61
E5A	9	72		L2	8	338
E5A	11	72		L2	11	338
E1	9	276		E5A	8	73
E1	9	563		E5A	10	73
E1	10	563		E1	8	514
E5A	8	56		E1	9	514
E5A	10	56		E7	9	29
E2	8	42		E1	8	277
E2	10	42		E5A	9	47
E5A	8	52		E5A	10	47
E5A	9	52		E5A	11	47
E5A	10	52		L1	8	295
E5A	11	52		E2	10	222
E2	8	94		E2	11	222
E2	11	94		E1	8	564
E5A	8	65		E1	9	564
E5A	9	65		E7	8	67
E5A	10	65		E7	10	67
L1	10	367		L1	8	95

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

L1	10	95		E1	8	539
L1	10	233		E1	10	539
E4	8	11		L1	9	438
E4	9	11		E6	9	21
E4	11	11		E1	11	397
L2	8	87		L1	8	337
L2	11	87		L1	9	337
L1	11	383		L1	10	337
E5B	11	26		L1	8	323
E1	8	306		L1	10	323
E5B	11	2		L1	11	323
E1	10	398		E1	10	304
E1	11	398		E6	9	75
E2	8	75		L2	8	38
E2	9	75		E1	11	96
E2	11	75		E2	9	127
E2	9	56		E2	11	127
L1	8	338		E1	11	607
L1	9	338		L1	8	289
E2	10	151		L2	8	385
E1	10	47		L2	10	377
E1	11	47		L2	11	377
L1	8	196		L1	9	142
L1	9	196		L1	11	142
E1	10	19		E7	9	64
L1	8	154		E7	11	64
E1	11	274		L2	10	237
E1	10	361		L2	11	237
L2	8	115		L2	8	124
L2	11	115		L2	9	124
E2	9	71		L2	9	285
E2	8	249		L2	10	285
E2	11	249		L2	8	139
E6	8	36		L2	9	139
L2	8	270		L2	8	420
L2	10	270		L2	10	420
L2	11	270		L2	11	420
E1	10	389		E5A	9	78
E6	8	5		E5A	10	78
E6	9	5		E5A	11	78
E1	9	329		E2	8	216
E1	9	600		E2	8	196
E1	8	270		E2	11	196
E1	9	270		L1	8	482
E1	10	270		L1	9	482
E1	11	270		L2	9	325
E1	8	451		L2	11	325
E1	9	451		L1	8	217
L1	11	31		L2	9	189
E4	8	5		L2	11	189
E4	9	5		E1	8	94
E4	11	5		E1	9	94
E1	8	300		E1	11	442
E1	9	300		E4	10	69
L2	8	366		E4	11	69
L2	10	366		E6	8	110
E1	9	55		E6	11	110
E1	11	55		E4	10	44
E7	8	88		L1	8	183
E7	11	88		L1	9	183
L1	10	445		L2	8	451

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

L2	9	451		L1	10	175
L1	8	458		E5A	8	5
E7	8	47		E5A	9	5
E7	9	47		E5A	11	5
E7	10	47		L1	8	16
E1	8	562		L1	10	16
E1	10	562		L2	8	363
E1	11	562		L2	10	363
E5A	8	64		L2	11	363
E5A	9	64		L2	8	417
E5A	10	64		L2	11	417
E5A	11	64		L2	8	91
L2	10	73		L2	8	252
L2	11	73		L2	10	252
L2	8	389		L2	8	328
L2	10	389		L2	11	328
E1	8	258		E1	9	636
E1	11	258		E1	10	636
L2	9	337		E1	11	636
E1	8	513		L1	8	177
E1	9	513		L1	10	177
E1	10	513		L1	11	177
L2	8	86		L1	9	419
L2	9	86		E1	9	399
L2	9	410		E1	10	399
L2	10	410		E1	11	399
E1	10	545		E1	9	64
E1	11	545		E1	11	64
L2	11	168		E5A	9	7
L2	11	243		E5A	11	7
L2	8	423		L2	8	43
E2	10	354		L2	10	43
E4	8	77		E6	10	28
E4	10	77		E6	11	28
E4	11	77		E1	10	31
E1	9	182		E6	8	15
E1	11	182		E6	10	15
L2	9	359		L1	8	151
L2	10	207		L1	11	151
L2	11	207		L1	9	372
L1	9	90		L1	11	372
L1	11	90		L1	9	301
L2	8	183		L1	9	324
L2	11	183		L1	10	324
L2	9	96		E2	11	14
L2	10	96		E7	9	81
E2	9	258		E7	10	81
E2	10	258		E7	10	28
E2	11	258		L2	8	16
L2	8	171		L2	9	16
L2	9	171		L2	11	16
L2	10	171		E4	8	14
L2	11	426		E4	10	14
L2	8	158		E4	11	14
L2	9	158		L1	11	232
E7	10	20		L1	11	250
E7	11	20		E2	9	48
E5A	8	19		E2	11	48
E5A	11	19		E2	8	76
L1	8	266		E2	10	76
L2	11	212		E1	9	305

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

E2	9	344		E2	10	343
E7	8	80		E1	9	343
E7	10	80		E1	10	343
E7	11	80		E2	10	84
E2	8	244		E2	11	84
E2	10	244		E1	9	324
E2	11	244		E1	10	324
L2	8	19		E1	11	324
L1	9	210		L1	8	476
L1	11	210		L1	9	476
E2	8	233		L2	9	68
E2	11	233		L2	11	68
L1	10	149		E1	9	293
L2	8	75		L1	8	29
L2	9	75		L1	8	279
E2	10	218		L1	10	279
E1	8	344		L2	8	221
E1	9	344		L2	9	221
L2	8	231		L1	11	140
L2	10	231		L1	9	488
L2	8	233		L1	11	488
L2	10	233		L1	8	379
E2	8	57		L1	10	379
E2	11	57		L1	11	379
E1	8	391		L2	8	111
E1	10	391		L2	11	111
L1	9	259		L2	11	77
L2	8	227		E6	8	3
L2	9	227		E6	9	3
L1	10	53		E6	10	3
L2	8	5		E6	11	3
L2	10	5		L2	10	181
L2	11	5		L2	8	13
L2	10	11		L2	11	13
E5B	9	35		E6	8	9
L2	8	298		E6	11	9
L2	10	298		E1	8	547
L2	8	316		E1	9	547
L2	11	316		E1	10	547
L2	9	449		E1	11	547
L2	10	449		L2	9	153
L2	11	449		L2	9	267
E2	9	7		L2	11	267
E2	10	7		E5A	8	30
E1	8	109		L1	8	50
L1	11	241		L1	9	50
E1	8	125		L1	10	50
E1	9	125		E2	9	207
L2	8	281		E2	11	207
L2	9	245		L1	10	474
E2	9	303		L1	11	474
E1	8	616		E1	9	247
E7	9	66		E1	10	247
E7	11	66		L1	8	375
L1	9	94		L1	9	375
L1	11	94		L1	10	375
E1	9	69		L2	8	81
E1	10	69		L2	10	103
E1	11	69		L2	11	103
E1	10	117		L1	11	285
E2	8	343		L1	10	86

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

L1	11	86		E2	10	40
L2	9	49		E5A	8	45
L2	11	49		E5A	9	45
L2	8	106		E5A	11	45
L2	9	106		L2	9	260
L2	11	106		E1	8	185
E1	9	490		E1	9	185
E1	10	490		E1	11	185
E1	11	490		E2	9	198
E2	9	81		E2	11	198
L2	8	391		L2	9	164
E4	8	90		L2	11	164
L1	9	294		L2	8	145
E1	9	260		L2	10	145
E1	10	260		L1	9	343
E2	10	88		E6	8	40
E6	10	23		E1	8	192
L2	10	304		L2	11	408
E2	8	150		L2	9	216
E2	11	150		E1	10	97
E1	10	635		E6	8	12
E1	11	635		E6	11	12
L1	10	418		E2	9	355
E1	8	354		E2	11	355
E1	9	354		L2	8	130
E7	10	45		L2	9	130
E7	11	45		L2	11	130
E2	8	23		E4	10	92
E2	9	23		E4	11	92
E5A	8	14		E1	8	294
E5A	9	14		L1	8	339
E5A	10	14		L1	11	339
E4	8	96		E4	9	78
E4	9	96		E4	10	78
E4	10	96		E4	11	78
E2	9	226		L1	9	408
E2	8	220		L1	11	270
L1	8	335		E1	8	556
L1	10	335		E1	9	556
L1	11	335		E1	10	556
L2	8	241		E1	11	556
L2	8	210		E7	9	7
E6	10	7		E5A	8	50
E2	8	201		E5A	10	50
E2	9	211		E5A	11	50
E2	11	211		E1	10	297
E1	8	289		E1	11	297
E1	9	289		E5A	9	71
E1	10	289		E5A	10	71
E1	11	289		E7	8	86
E2	8	190		E7	10	86
E2	10	190		E2	9	93
E1	11	331		L1	8	377
L1	11	7		L1	10	377
E2	10	317		E2	11	221
L1	8	281		E1	9	408
L1	10	281		E1	11	408
L1	8	189		E2	8	128
L1	9	189		E2	10	128
L1	11	189		E5B	11	59
L1	10	392		E2	10	203

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

E2	11	203		E1	8	290
L2	8	360		E1	9	290
L2	11	360		E1	10	290
E1	11	30		E6	10	88
L1	9	150		E6	11	88
L2	9	15		E4	9	83
L2	10	15		E4	10	83
E1	8	526		E4	11	83
E1	10	526		E2	10	116
L2	9	166		E2	9	191
L2	8	380		E1	8	345
L2	9	380		E1	10	332
L2	11	380		E1	11	332
L1	9	92		L2	10	387
L1	11	92		E1	10	78
E1	8	148		L2	9	378
E6	9	39		L2	10	378
L1	9	223		L2	11	378
L1	11	223		L2	10	184
E1	8	232		E4	8	102
E1	9	232		L1	9	328
E6	8	142		L1	11	328
E5B	9	63		L1	10	8
E6	9	11		E1	9	317
L2	8	137		E1	11	317
L2	10	137		L2	10	339
L2	11	137		E1	10	239
E5A	8	62		E1	8	519
E5A	9	62		L2	8	97
E5A	10	62		L2	9	97
E5A	11	62		L2	11	97
E2	11	202		E1	8	291
L1	8	91		E1	9	291
L1	10	91		E1	11	291
L1	8	332		L1	8	21
L1	9	332		L1	10	21
L1	11	332		E2	8	192
L2	9	151		E2	11	192
L2	11	151		E1	9	333
E4	8	87		E1	10	333
E4	9	87		E5A	10	20
E4	11	87		L2	9	31
E5A	9	12		L2	10	31
E5A	10	12		L2	11	31
E5A	11	12		L1	8	190
E4	8	94		L1	10	190
E4	9	94		E7	10	12
E4	10	94		L1	9	393
E4	11	94		E6	10	53
L2	9	136		E6	11	53
L2	11	136		E4	8	17
L2	10	150		E4	9	17
E4	8	86		E1	10	275
E4	9	86		E2	9	41
E4	10	86		E2	11	41
E6	11	87		L1	9	73
L2	11	386		L1	10	73
E4	9	101		E5A	8	48
E2	8	212		E5A	9	48
E2	10	212		E5A	10	48
E2	11	212		E5A	8	46

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

E5A	10	46		L1	10	72
E5A	11	46		L1	11	72
E4	8	10		E2	10	58
E4	9	10		E5A	8	3
E4	10	10		E5A	10	3
L1	8	382		E5A	11	3
L1	9	176		E7	9	68
L1	11	176		L2	10	199
E7	8	69		E2	8	132
E7	11	69		L1	8	97
E1	9	79		E2	11	321
E2	8	139		E1	9	426
E2	10	139		E5A	9	36
E1	9	444		E5A	11	36
E2	10	288		E1	8	340
L2	8	261		E1	8	530
L2	11	261		E1	11	530
E1	9	24		E5B	9	13
E5A	8	6		E5B	11	13
E5A	10	6		E1	11	464
E7	8	79		E5B	8	17
E7	9	79		E5B	10	17
E7	11	79		E5B	11	17
E2	8	243		E5A	8	58
E2	9	243		E1	8	510
E2	11	243		E1	10	510
E2	9	232		E1	11	510
L2	9	232		E1	8	267
L2	11	232		E1	9	267
E1	9	362		E1	10	267
E7	11	55		E1	11	267
L2	9	234		E2	11	134
E7	8	6		E2	10	92
E7	10	6		E6	8	141
L2	9	364		E6	9	141
L2	10	364		E4	10	82
L2	10	418		E4	11	82
L2	8	165		E2	8	145
L2	10	165		E2	10	145
L2	8	379		E1	8	237
L2	9	379		E6	8	61
L2	10	379		L2	9	349
L1	10	27		E6	8	82
L2	9	185		E1	8	262
L2	11	185		E1	10	262
L2	9	146		E1	11	380
E1	8	565		E6	9	85
L1	8	344		E6	8	46
L1	10	327		E6	9	46
E1	11	238		L1	9	385
L1	8	20		L1	10	385
L1	9	20		E5A	8	81
L1	11	20		E5A	9	81
E5A	8	25		E4	11	22
E5A	9	25		E6	10	105
E5A	10	25		E1	10	86
E5A	11	25		L2	9	435
L1	8	329		E1	8	579
L1	10	329		E1	10	579
L1	11	329		E5A	8	54
E2	8	349		E5A	9	54

Table VIIIB HPV 6B
HLA-A2 Supermotif Peptides

E5A	10	54
L2	8	371
L2	9	371
L2	10	371
E1	9	532
E1	10	532
L1	10	358
E1	11	536
L2	9	18
L1	8	65
L1	9	65
L1	10	65
E2	8	159
E2	11	159
L1	10	350
E2	8	214
E2	9	214
E2	10	214
E5A	8	43
E5A	9	43
E5A	10	43
E5A	11	43
E5B	8	62
E5B	10	62
E1	8	402
E4	8	16
E4	9	16
E4	10	16
E4	9	9
E4	10	9
E4	11	9
E2	8	168
L1	9	287
L1	10	287
L2	8	71
L1	8	10
L1	11	10
E2	9	138
E2	11	138
L1	8	415
E1	8	91
E1	9	91
E1	11	91
E5B	8	57
L1	11	26
E2	9	131

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

2	3	4		2	3	4
E5	8	9		E2	10	217
E5	9	9		L1	9	22
E5	10	9		L1	11	22
E6	9	62		L2	9	22
L1.	9	235		L2	10	22
L2	10	328		L2	10	13
L2	11	328		L2	11	13
L2	9	339		E1	9	525
L2	11	339		E1	11	525
E4	8	12		E6	10	10
E4	10	12		E5	8	11
L2	8	86		E5	10	11
L2	11	86		E5	11	11
E2	8	282		E1	11	77
E5	8	10		E5	8	25
E5	9	10		E5	9	25
E5	11	10		E5	10	25
E6	11	83		E5	11	25
E2	8	3		E1	10	181
E2	8	72		E1	10	101
E2	11	72		L1	9	43
L2	10	111		E5	8	37
L2	11	111		E5	11	37
E1	11	112		E5	8	26
L2	8	139		L1	8	484
L2	11	139		E1	8	601
E1	10	407		E6	11	64
L1	8	421		E1	11	234
L2	8	80		E1	11	406
L2	8	285		E5	10	46
L2	9	285		E5	11	46
E1	9	22		L1	8	342
E1	11	22		L1	9	342
E1	8	475		L1	11	342
E1	8	65		E1	10	473
E1	10	65		E5	8	27
L1	11	81		E5	9	27
L2	9	417		E5	10	27
L2	10	417		E5	11	27
L2	8	227		E2	8	35
L2	11	227		E2	9	35
E1	10	554		E6	8	67
E1	11	554		E6	9	137
E6	9	37		E2	9	295
E6	11	37		E1	8	488
E4	8	24		E1	11	488
E4	9	24		L1	9	154
E4	11	24		E2	8	11
E1	9	319		E7	9	71
L1	9	204		E1	9	14
E1	10	63		E1	10	14
L1	8	313		E1	11	14
L1	10	301		E2	9	227
E4	9	13		E1	9	289
E4	11	13		E1	10	289
E7	10	45		E1	11	289
E7	11	45		E2	8	251
E1	10	381		E2	11	251
E2	8	217		E5	10	73
				E6	8	31

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

E6	9	31	E1	8	191
E6	10	31	E1	9	191
E6	11	31	E2	8	96
E1	9	640	E2	9	96
E1	10	640	L1	8	332
E4	10	73	L1	9	332
E4	11	73	L1	10	332
E2	8	9	E5	8	12
E2	10	9	E5	10	12
E1	10	250	E5	11	12
E1	10	73	E1	8	534
E2	8	153	L1	10	412
E1	10	516	L1	11	412
E1	11	516	L2	9	29
E1	11	607	L2	10	29
E7	11	44	L2	11	29
E6	9	5	L1	9	216
E1	8	524	L1	10	216
E1	10	524	L2	11	257
L1	9	24	L2	8	142
E1	8	369	L2	9	142
E1	9	369	L2	10	142
L2	9	277	E1	8	71
L2	10	277	E1	9	71
L2	11	277	E1	9	178
E6	11	96	L2	9	273
L2	8	191	E2	9	2
L2	9	191	E1	8	21
E7	8	75	E1	10	21
E7	9	75	E1	10	336
E7	10	75	E1	11	336
E1	11	570	E2	8	324
L2	8	321	E2	9	324
L2	9	321	E2	10	324
L2	9	399	E2	11	324
L2	11	399	E1	11	62
L2	10	346	E2	8	174
E1	11	222	L1	11	300
E7	9	81	L2	8	172
E7	10	81	L2	10	172
L1	8	367	E1	11	180
L1	11	367	E6	8	113
E7	8	14	E6	9	113
E7	10	14	L2	8	331
L1	9	209	L2	9	331
L1	11	209	L2	10	331
L1	9	439	E1	8	105
E1	11	46	E1	9	105
L1	9	196	E1	11	105
L1	10	196	E6	10	42
L1	10	456	E2	10	312
L1	11	456	L2	8	333
L2	9	41	E1	8	197
L2	11	41	E1	11	197
E6	9	14	E2	8	17
E6	11	14	E2	10	17
L1	10	199	E1	11	417
E1	9	481	E2	9	74
E1	11	481	E2	10	74
E1	11	164	E1	11	360

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

E7	11	27		E1	10	18
E2	10	340		E1	11	18
E2	8	66		L2	8	319
E2	10	66		L2	10	319
E6	9	92		L2	11	319
E6	10	92		E1	8	252
E6	11	92		E1	10	252
E2	8	185		L1	8	372
E2	9	185		L1	10	372
E7	10	36		L2	11	154
E1	8	141		E5	8	20
E1	9	39		E5	9	20
E1	10	39		E5	11	20
L1	8	103		L2	9	262
L1	10	103		L2	9	128
E2	11	118		L2	10	128
L1	8	382		L2	8	393
L1	9	382		L2	9	393
E2	8	205		L1	8	327
E2	9	205		L1	11	327
E2	11	205		E5	8	23
L2	11	119		E5	9	23
E5	8	2		E5	10	23
E5	9	2		E5	11	23
E5	10	2		L2	11	197
E5	11	2		E5	8	40
E6	8	61		E5	9	40
E6	10	61		E5	10	40
L1	11	207		E5	11	40
L1	8	80		L2	8	61
L1	9	253		L2	11	61
L1	11	253		L1	8	203
L2	9	438		L1	10	203
L2	11	438		L2	9	116
E5	8	24		L2	10	313
E5	9	24		L1	8	319
E5	10	24		L1	10	319
E5	11	24		L1	11	319
E1	8	50		E1	9	243
L1	8	370		E1	11	194
L1	9	370		E1	8	326
L1	10	370		E1	9	326
E1	8	454		E2	11	156
E1	10	454		L1	10	101
L2	9	424		L2	8	55
E1	10	494		E7	8	22
L1	11	464		E5	9	29
E1	8	393		E5	10	29
E1	11	393		E2	8	55
E2	10	345		E2	9	55
E2	11	345		E2	10	55
E1	10	446		E1	8	217
E1	9	457		E2	9	50
L2	8	238		E2	10	50
L2	9	238		L1	9	401
L2	10	238		L1	10	401
E5	9	16		L2	8	291
E5	10	16		L2	10	222
E5	11	16		L1	9	145
L2	11	275		L1	11	145

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

E1	8	273		E2	8	78
L1	8	137		E2	9	309
L1	10	137		L1	9	325
E1	10	160		L1	10	325
E2	8	162		E5	9	7
L2	8	309		E5	11	7
L1	8	107		E1	9	305
L2	8	299		E1	10	449
L2	8	24		E2	10	273
L2	11	24		E2	11	273
E5	8	40		E6	8	25
E1	10	6		L1	8	388
L2	10	59		E4	10	36
L1	10	408		L1	8	290
E1	11	296		L2	8	36
E7	9	85		L2	9	36
E7	11	85		L2	11	148
L2	8	408		E4	8	64
L2	10	408		E4	11	64
L2	11	408		L2	9	188
E1	8	467		L2	11	188
E1	9	467		L1	10	362
E1	10	467		E5	8	8
E1	11	467		E5	9	8
L1	9	169		E5	10	8
E4	8	99		E5	11	8
E4	10	99		E1	8	248
L1	10	223		E1	9	248
L1	11	262		L2	11	39
E1	9	173		E2	8	208
E1	10	173		E2	10	208
E2	10	88		E5	8	22
L2	9	50		E5	10	22
L2	11	50		E5	11	22
L1	9	111		E1	9	474
L1	10	111		E4	8	5
E1	10	316		E4	9	5
E2	10	232		E4	11	5
L1	8	113		E5	8	34
E1	8	189		E5	9	34
E1	10	189		E5	11	34
E1	11	189		L2	9	112
E1	9	415		L2	10	112
L1	8	35		L2	8	278
L1	9	35		L2	9	278
L1	10	35		L2	10	278
E2	10	53		L2	10	140
E2	11	53		L2	11	140
E6	9	119		E1	10	195
E6	11	119		E6	8	120
L2	8	176		E6	10	120
L2	9	176		L2	8	177
L2	10	176		L2	9	177
E2	8	29		E5	8	35
E2	10	29		E5	10	35
E1	8	264		E6	10	97
E1	11	264		L2	9	43
E1	9	55		E5	9	17
E1	11	55		E5	10	17
E2	11	136		E5	8	28

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

Protein	Length	Position		Protein	Length	Position
E5	9	28		E1	8	420
E5	10	28		E7	8	42
E1	9	408		L1	8	433
E1	11	408		E2	8	112
E2	9	30		E2	8	47
E6	9	29		E2	10	47
E6	10	29		L1	8	149
E6	11	29		L1	11	149
L1	9	192		E1	9	424
L2	9	165		E1	11	424
E1	8	313		E4	8	53
E1	10	265		E6	9	18
E1	11	265		E6	10	18
L2	8	400		E2	10	84
L2	10	400		E2	11	84
L2	11	81		E2	11	165
L2	8	425		E1	8	518
L2	11	425		E1	9	518
L1	8	377		E7	10	39
L1	9	377		E7	11	39
L1	11	377		E1	11	433
E1	8	56		L2	8	33
E1	10	56		L2	11	33
E1	11	56		E2	9	358
E1	11	341		E2	10	358
L2	9	184		E1	9	121
L2	11	184		E6	8	99
L2	8	286		E1	8	283
L2	8	130		E1	9	283
L2	10	130		E1	10	283
L2	11	130		L1	10	53
L1	10	188		L1	9	61
L1	11	188		E2	8	147
E4	9	92		E2	11	147
E4	10	92		L1	9	19
E4	11	92		L1	11	71
E1	8	23		E6	11	52
E1	10	23		E1	8	351
E7	11	11		E1	9	351
E5	11	31		E1	11	351
E1	10	443		E2	8	82
E2	11	286		E4	9	23
L2	9	103		E4	10	23
L2	10	103		E2	9	313
L2	11	103		L1	10	42
E2	10	45		L2	8	106
L1	9	312		L2	10	106
L2	10	21		E1	9	255
L2	11	21		E1	11	255
E6	11	73		E1	11	307
E2	10	350		E5	9	33
E1	8	312		E5	10	33
E1	9	312		E1	8	557
E1	8	254		E1	9	557
E1	10	254		E1	10	557
E6	9	116		E1	8	491
E1	9	460		E1	9	491
E6	11	128		E1	10	491
E1	9	357		E5	8	16
E1	9	114		E5	10	16

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

E5	11	16		E5	8	65
E6	11	101		E5	10	65
E1	10	223		L1	10	368
E1	11	223		L1	11	368
L2	8	178		L2	8	260
E5	9	36		L2	11	260
E5	11	36		E2	8	289
L1	11	187		E6	11	27
L1	11	41		L1	11	310
E1	11	521		E1	9	511
E1	9	540		E1	10	511
E2	10	15		E1	11	511
E7	8	83		E7	9	15
E7	11	83		L2	10	228
E2	8	42		L1	9	466
E2	10	42		L1	11	466
E4	8	18		L1	8	210
E5	10	32		L1	10	210
E1	10	198		E2	8	56
E1	11	198		E2	9	56
E7	8	82		E7	11	55
E7	9	82		E5	10	4
E5	8	31		E1	8	514
E5	11	31		E1	9	514
E5	8	30		E1	11	132
E5	9	30		E1	8	358
E5	11	59		E4	11	90
E5	8	55		E5	10	70
E5	9	55		E1	9	555
E5	11	55		E1	10	555
E5	9	51		E1	11	555
E5	10	51		E5	8	49
E5	11	51		E5	9	49
E1	9	298		E5	11	49
E1	10	298		E1	8	268
E1	11	298		E1	9	268
L1	8	119		E1	10	268
L1	10	465		E1	11	268
E5	11	69		E7	8	48
E5	10	60		E7	9	48
E5	11	60		L2	8	368
E1	9	276		E6	8	38
E1	9	563		E6	10	38
E5	8	56		E4	9	69
E5	10	56		E5	9	61
E5	8	52		E5	10	61
E5	9	52		E5	11	61
E5	10	52		E1	8	115
E5	11	52		E2	11	62
E4	10	45		L2	8	337
E4	11	45		L2	11	337
E7	8	79		L1	11	273
E7	9	79		E1	8	277
E7	11	79		E5	9	47
E2	8	139		E5	10	47
E2	10	139		E5	11	47
E2	11	139		L1	8	296
E2	8	94		E7	8	5
E2	10	94		E7	9	5
E2	11	94		E7	11	5

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

E1	8	564		E6	8	131
L2	8	245		E6	9	75
E7	10	67		E6	10	75
L1	8	95		E2	8	248
L1	10	95		E2	11	248
L1	10	234		L2	10	373
E4	8	11		L2	11	373
E4	9	11		E5	9	54
E4	11	11		L2	8	381
L1	11	384		E1	10	97
E1	8	306		L1	9	143
E5	11	3		L1	11	143
E1	10	398		E2	9	127
E1	11	398		E2	11	127
E2	8	75		E7	9	64
E2	9	75		L2	8	85
E2	11	75		L2	9	85
L1	11	339		L2	10	236
E1	10	47		L2	11	236
E1	11	47		E5	9	78
L1	8	197		E5	10	78
L1	9	197		L2	8	138
E1	9	19		L2	9	138
E1	10	19		L2	8	79
L1	8	155		L2	9	79
E1	11	274		L2	9	284
E5	8	1		L2	10	284
E1	10	361		L2	8	416
E4	10	1		L2	10	416
E4	11	1		L2	11	416
L2	8	114		E2	8	216
L2	11	114		E2	9	216
E2	9	71		E2	11	216
E6	8	36		E2	8	196
E6	10	36		E2	11	196
L2	8	269		L1	8	483
L2	10	269		L1	9	483
L2	11	269		E4	8	4
E1	10	389		E4	9	4
E1	9	329		E4	10	4
E1	11	100		L2	10	354
E1	9	600		L2	11	354
E1	8	270		E1	8	94
E1	9	270		E1	9	94
E1	10	270		E1	11	442
E1	11	270		E6	8	110
E1	8	451		E6	11	110
E1	11	451		L1	8	218
L1	11	31		L1	8	184
E1	8	300		L1	9	184
E1	9	300		L2	8	447
E2	8	254		L2	9	447
E2	9	254		L2	8	157
E7	8	88		L2	9	157
L1	10	446		L1	10	161
E1	8	539		L1	8	459
E1	10	539		L2	9	72
E6	9	21		L2	10	72
E1	11	397		L2	11	72
L1	8	338		L1	11	109

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

L1	9	118		E5	8	19
E4	8	30		E5	10	19
E1	8	562		E5	11	19
E1	10	562		L2	8	251
L2	11	211		L2	10	251
E4	11	44		L2	8	327
E5	8	64		L2	11	327
E5	9	64		E1	10	636
E5	11	64		E1	11	636
L2	10	385		L1	9	420
E1	8	258		E1	9	399
E1	11	258		E1	10	399
E1	8	513		E1	11	399
E1	9	513		E1	9	64
E1	10	513		E1	11	64
E7	8	47		E5	8	7
E7	9	47		E5	9	7
E7	10	47		E5	10	7
E4	10	68		E5	11	7
L2	9	336		L2	8	42
E1	10	545		L2	10	42
E1	11	545		E6	10	28
L2	11	167		E6	11	28
L2	11	242		E1	10	31
L2	8	419		E6	8	15
E2	10	353		E6	10	15
L2	8	182		L1	8	152
L2	11	182		L1	11	152
L2	8	123		L1	9	373
L2	9	123		L1	11	373
E4	8	76		E7	10	28
E4	11	76		L1	9	302
L2	10	206		E2	11	14
L1	9	90		E7	9	78
L1	11	90		E7	10	78
E2	9	211		E2	9	288
E2	10	211		L2	8	15
E2	11	211		L2	9	15
E6	11	87		L2	11	15
E2	8	222		E4	8	14
L2	9	95		E4	10	14
L2	10	95		E4	11	14
L2	8	170		L1	11	233
L2	9	170		L1	11	251
L2	10	170		E2	9	48
L2	11	422		E2	11	48
E7	10	20		E2	8	76
L2	8	90		E2	10	76
L1	8	267		E2	9	343
L2	11	358		L2	9	229
E5	8	5		L2	11	229
E5	9	5		L2	8	18
E5	10	5		L1	9	211
E5	11	5		L1	11	211
L1	8	16		L1	10	150
L1	10	16		E2	9	218
L2	8	413		E2	11	218
L2	11	413		E1	8	344
L2	9	324		E1	9	344
L2	11	324		L2	8	230

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

L2	10	230		E1	9	324
L2	8	232		E1	10	324
L2	10	232		E1	11	324
E2	8	57		E1	9	293
E2	11	57		L1	8	29
E1	8	391		L1	8	473
E1	10	391		E1	8	231
L2	8	214		E1	9	231
L2	10	214		E1	10	231
L1	9	260		L2	8	220
L2	8	226		L2	9	220
L2	9	226		L1	11	141
E1	11	553		E2	9	281
E1	8	318		E2	9	225
E1	10	318		E2	11	225
E2	10	240		L1	8	380
E2	11	240		L1	10	380
L2	8	4		L1	11	380
L2	10	4		L2	8	110
L2	11	4		L2	11	110
L2	10	10		E2	8	234
E5	9	36		L2	10	180
L2	8	297		L1	10	475
L2	10	297		L1	11	475
L2	8	315		L2	8	12
L2	11	315		L2	11	12
L2	9	445		E6	8	9
L2	10	445		E6	11	9
L2	11	445		E1	9	247
E2	9	7		E1	10	247
E2	10	7		E2	9	207
E1	8	109		E2	11	207
E1	9	109		E2	8	23
E2	10	37		E2	9	23
E1	8	125		E6	8	12
E1	9	125		E6	11	12
L1	11	242		E1	8	547
E4	11	59		E1	9	547
L2	8	280		E1	10	547
E2	9	302		E1	11	547
E1	8	616		L2	9	266
E7	8	4		L2	11	266
E7	9	4		L1	8	50
E7	10	4		L1	9	50
L2	9	244		L1	10	50
E7	11	66		E1	11	422
L1	9	94		L2	8	387
L1	11	94		L1	8	376
E1	9	69		L1	9	376
E1	10	69		L1	10	376
E1	11	69		E5	8	30
E7	8	77		L2	10	102
E7	10	77		L2	11	102
E7	11	77		L1	11	286
E2	8	342		E1	9	350
E2	10	342		E1	10	350
E1	9	343		E2	9	81
E1	10	343		L1	10	86
L1	8	477		L1	11	86
L1	9	477		L2	9	48

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

L2	11	48		E1	9	436
E6	10	23		L1	8	190
L2	8	105		L1	9	190
L2	9	105		L1	11	190
L2	11	105		L2	9	163
E1	9	490		L2	11	163
E1	10	490		E2	8	348
E1	11	490		L1	10	393
L2	9	259		E2	10	40
E4	8	89		E5	8	45
L1	9	295		E5	9	45
E1	9	260		E5	11	45
E1	10	260		L1	10	176
L2	9	406		L1	9	344
L2	10	406		E2	9	198
L2	10	303		E2	11	198
E1	11	635		L2	8	144
L1	10	419		L2	10	144
E1	8	354		L2	8	362
E1	9	354		L2	10	362
L2	9	186		E6	8	40
L2	11	186		E5	8	21
L2	8	376		E5	10	21
L2	9	376		E5	11	21
L2	11	376		L1	8	490
L1	9	489		L1	10	490
L1	11	489		E2	9	220
E2	8	260		E2	10	220
E4	8	95		L2	11	404
E4	9	95		E2	9	354
E4	10	95		E2	11	354
L1	8	336		L2	10	183
L1	10	336		L2	8	129
E2	8	245		L2	9	129
E2	9	245		L2	11	129
E2	11	245		E4	10	91
L2	8	240		E4	11	91
E1	8	185		L1	10	340
E1	11	185		L1	11	340
E6	10	7		E2	10	249
L2	9	135		E5	9	71
L2	11	135		L1	9	409
E4	8	85		E1	8	294
E4	9	85		E1	8	556
E4	10	85		E1	9	556
E2	8	190		E1	10	556
E2	10	190		E1	11	556
E1	11	331		E5	8	15
E2	8	201		E5	9	15
E2	9	201		E5	11	15
L1	11	7		E7	9	7
E2	10	316		E5	8	50
L1	8	282		E5	10	50
L1	10	282		E5	11	50
E2	10	151		E1	10	297
E2	9	257		E1	11	297
E2	10	257		E7	8	86
E2	11	257		E7	10	86
L2	9	152		E2	9	93
E1	8	436		E2	11	93

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

L1	8	378	E5	9	13
L1	10	378	E5	10	13
L2	9	374	E5	11	13
L2	10	374	L2	10	149
L2	11	374	E5	9	12
L2	9	326	E5	10	12
L1	8	170	E5	11	12
L2	8	124	E5	8	55
E7	8	49	E4	9	100
E1	11	30	E2	8	212
L1	9	151	E2	9	212
L2	9	14	E2	10	212
L2	10	14	E1	8	290
E1	9	57	E1	9	290
E1	10	57	E1	10	290
E1	8	526	L1	9	224
E1	10	526	L1	11	224
E1	10	117	E6	10	88
L1	9	92	E6	11	88
L1	11	92	L1	10	263
L2	8	364	L1	11	263
L2	11	364	E2	9	191
E2	9	85	E1	8	345
E2	10	85	E1	10	332
E6	9	39	E1	11	332
E2	8	219	E1	10	78
E2	10	219	E4	9	82
E2	11	219	E4	10	82
E1	8	232	E4	11	82
E1	9	232	E2	8	202
E6	8	142	E2	11	202
E2	8	228	E2	11	223
L2	8	37	E2	10	63
E5	8	14	E2	11	63
E5	9	14	E4	8	101
E5	10	14	L1	9	329
L2	8	136	L1	11	329
L2	10	136	L1	10	8
L2	11	136	L2	10	338
E4	8	70	E1	10	239
E5	8	62	E1	11	239
E5	9	62	E1	8	519
E5	10	62	E1	9	98
E5	11	62	E2	10	252
E1	11	116	E2	11	252
L1	8	91	L2	8	96
L1	10	91	L2	9	96
L1	8	333	L2	11	96
L1	9	333	E1	8	291
L1	11	333	E1	9	291
E4	8	86	E1	11	291
E4	9	86	L1	9	283
E4	11	86	L1	10	21
E4	8	93	E5	8	25
E4	9	93	E5	9	25
E4	10	93	E5	8	21
E4	11	93	E5	9	21
L2	9	150	E5	11	21
L2	11	150	E2	8	192
E5	8	13	E2	11	192

PCT/US00/33549

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

E1	9	333		L2	10	325
E1	10	333		L2	9	363
L2	8	30		E2	10	148
L2	9	30		L1	10	328
L2	10	30		E1	11	238
L2	11	30		L1	8	20
L1	8	191		L1	11	20
L1	10	191		E5	8	24
L2	8	164		E5	9	24
L2	10	164		E5	10	24
E7	10	12		L1	8	330
L1	9	394		L1	10	330
E5	11	27		L1	11	330
E5	10	32		E7	9	68
E5	11	32		E5	9	20
E2	9	41		E5	10	20
E2	11	41		L1	10	72
E4	8	17		L1	11	72
E4	9	17		E4	9	2
E1	10	275		E4	10	2
L1	9	73		E4	11	2
L1	10	73		E2	10	58
E5	8	48		L2	10	120
E5	9	48		L2	11	120
E5	10	48		E5	8	3
E5	8	46		E5	9	3
E5	10	46		E5	10	3
E5	11	46		E5	11	3
E4	8	10		L2	10	198
E4	9	10		E6	10	53
E4	10	10		E6	11	53
L1	8	383		E2	8	132
E2	8	128		E5	8	41
E2	10	128		E5	9	41
E1	9	79		E5	10	41
E1	9	444		E5	11	41
L2	10	359		L1	8	97
L2	11	359		E2	11	320
E5	8	6		E1	9	426
E5	9	6		E1	8	340
E5	10	6		E5	8	14
E5	11	6		E5	9	14
E2	10	287		E5	11	14
L1	9	177		E5	8	18
L1	11	177		E5	9	18
L2	8	394		E5	10	18
L2	11	394		E5	11	18
E4	8	83		E1	11	464
E4	9	83		E5	8	58
E4	10	83		E1	8	510
E4	11	83		E1	10	510
L2	9	231		E1	11	510
L2	11	231		E1	8	267
E1	9	362		E1	9	267
L2	9	233		E1	10	267
E7	8	6		E1	11	267
E7	10	6		E2	10	92
L2	9	145		E6	8	141
L2	10	414		E6	9	141
L2	8	325		E4	10	81

Table VIIIC HPV11
HLA-A2 Supermotif Peptides

E4	11	81		L1	11	26
E1	8	530		E4	8	16
E1	11	530		E4	9	16
E2	8	145		E4	10	16
E2	10	145		E4	9	9
E1	8	237		E4	10	9
E6	8	82		E4	11	9
L2	8	348		E2	8	168
E1	8	262		E1	10	502
E1	10	262		L1	8	10
E6	9	85		L1	11	10
E1	11	380		L1	8	416
E6	8	44		E1	8	91
E6	10	44		E1	9	91
E6	11	44		E1	11	91
E6	8	46		E2	9	131
E6	9	46				
E5	9	81		SF 1168095 v1		
L1	9	386				
L1	10	386				
L2	11	70				
E4	10	22				
E4	11	22				
E6	10	105				
E1	10	86				
L2	9	431				
E1	8	579				
E1	10	579				
E5	8	54				
E5	9	54				
E5	10	54				
E2	9	138				
E2	11	138				
L1	9	246				
L2	8	367				
L2	9	367				
E1	9	532				
E1	10	532				
L1	10	359				
E1	11	536				
E5	11	61				
L2	9	17				
L1	8	65				
L1	9	65				
L1	10	65				
E2	8	159				
E2	11	159				
L1	10	351				
E2	8	214				
E2	10	214				
E2	11	214				
L2	8	305				
L2	10	305				
E5	8	43				
E5	9	43				
E5	10	43				
E5	11	43				
L1	9	288				
L1	10	288				
E1	8	402				

Table IX
HLA-A3 Supermotif Peptides

1	2	3	4
HPV16	E1	8	316
HPV16	E1	8	205
HPV16	E1	9	112
HPV16	E1	9	69
HPV16	E1	11	459
HPV16	E1	8	406
HPV16	E1	9	406
HPV16	E1	8	82
HPV16	E1	9	405
HPV16	E1	10	405
HPV16	E1	10	114
HPV16	E1	11	114
HPV16	E1	8	304
HPV16	E1	10	304
HPV16	E1	9	101
HPV16	E1	11	101
HPV16	E1	8	81
HPV16	E1	9	81
HPV16	E1	11	368
HPV16	E1	10	573
HPV16	E1	11	384
HPV16	E1	8	335
HPV16	E1	11	548
HPV16	E1	8	603
HPV16	E1	10	221
HPV16	E1	9	288
HPV16	E1	11	140
HPV16	E1	9	392
HPV16	E1	8	463
HPV16	E1	9	453
HPV16	E1	10	453
HPV16	E1	9	219
HPV16	E1	10	71
HPV16	E1	11	242
HPV16	E1	9	272
HPV16	E1	11	272
HPV16	E1	10	174
HPV16	E1	10	496
HPV16	E1	9	216
HPV16	E1	10	68
HPV16	E1	11	473
HPV16	E1	11	194
HPV16	E1	10	369
HPV16	E1	10	401
HPV16	E1	9	204
HPV16	E1	10	111
HPV16	E1	11	400
HPV16	E1	10	610
HPV16	E1	10	483
HPV16	E1	10	394
HPV16	E1	10	276
HPV16	E1	9	277
HPV16	E1	11	277
HPV16	E1	10	474
HPV16	E1	9	620
HPV16	E1	9	191
HPV16	E1	10	243
HPV16	E1	9	222
HPV16	E1	8	278
HPV16	E1	10	278
HPV16	E1	9	544
HPV16	E1	8	306
HPV16	E1	9	305
HPV16	E1	8	454
HPV16	E1	9	454
HPV16	E1	8	420
HPV16	E1	10	420
HPV16	E1	8	422
HPV16	E1	11	422
HPV16	E1	8	273
HPV16	E1	10	273
HPV16	E1	9	202
HPV16	E1	11	202
HPV16	E1	9	567
HPV16	E1	8	543
HPV16	E1	10	543
HPV16	E1	9	386
HPV16	E1	8	396
HPV16	E1	9	196
HPV16	E1	10	190
HPV16	E1	10	302
HPV16	E1	8	245
HPV16	E1	8	600
HPV16	E1	11	600
HPV16	E1	8	143
HPV16	E1	9	419
HPV16	E1	11	419
HPV16	E1	8	118
HPV16	E1	9	109
HPV16	E1	10	619
HPV16	E1	11	313
HPV16	E1	9	432
HPV16	E1	11	390
HPV16	E1	9	484
HPV16	E1	8	621
HPV16	E1	9	421
HPV16	E1	10	314
HPV16	E1	9	497
HPV16	E1	9	315
HPV16	E1	9	72
HPV16	E1	8	289
HPV16	E1	8	407
HPV16	E1	11	407
HPV16	E1	11	200
HPV16	E1	11	565
HPV16	E1	8	498
HPV16	E1	8	197
HPV16	E1	8	275
HPV16	E1	11	275
HPV16	E1	8	217
HPV16	E1	11	217
HPV16	E1	8	545
HPV16	E1	9	274
HPV16	E1	8	425
HPV16	E1	9	509
HPV16	E1	8	20
HPV16	E1	9	20
HPV16	E2	8	40
HPV16	E2	8	300

Table IX
HLA-A3 Supermotif Peptides

HPV16 E2	9	174		HPV16 E5	8	51
HPV16 E2	9	294		HPV16 E5	9	22
HPV16 E2	11	294		HPV16 E5	11	48
HPV16 E2	10	25		HPV16 E5	10	70
HPV16 E2	10	246		HPV16 E5	10	21
HPV16 E2	8	233		HPV16 E5	9	50
HPV16 E2	10	233		HPV16 E6	9	7
HPV16 E2	9	204		HPV16 E6	11	7
HPV16 E2	9	346		HPV16 E6	8	68
HPV16 E2	10	168		HPV16 E6	9	143
HPV16 E2	10	163		HPV16 E6	11	143
HPV16 E2	10	156		HPV16 E6	10	37
HPV16 E2	11	230		HPV16 E6	11	37
HPV16 E2	9	29		HPV16 E6	10	32
HPV16 E2	10	290		HPV16 E6	11	105
HPV16 E2	11	35		HPV16 E6	8	48
HPV16 E2	8	252		HPV16 E6	11	52
HPV16 E2	10	267		HPV16 E6	10	92
HPV16 E2	8	45		HPV16 E6	9	33
HPV16 E2	11	215		HPV16 E6	8	34
HPV16 E2	8	347		HPV16 E6	9	107
HPV16 E2	9	268		HPV16 E6	10	106
HPV16 E2	11	268		HPV16 E6	8	144
HPV16 E2	9	103		HPV16 E6	10	144
HPV16 E2	10	103		HPV16 E6	11	144
HPV16 E2	9	335		HPV16 E6	9	134
HPV16 E2	11	282		HPV16 E6	8	102
HPV16 E2	8	84		HPV16 E6	9	116
HPV16 E2	9	296		HPV16 E6	11	5
HPV16 E2	11	296		HPV16 E6	10	6
HPV16 E2	9	284		HPV16 E6	8	94
HPV16 E2	11	266		HPV16 E6	9	93
HPV16 E2	9	60		HPV16 E6	10	139
HPV16 E2	8	235		HPV16 E6	9	67
HPV16 E2	10	57		HPV16 E6	8	77
HPV16 E2	9	37		HPV16 E7	10	68
HPV16 E2	11	37		HPV16 E7	10	88
HPV16 E2	8	7		HPV16 E7	9	89
HPV16 E2	8	165		HPV16 E7	8	53
HPV16 E2	11	317		HPV16 E7	9	41
HPV16 E2	8	269		HPV16 E7	8	70
HPV16 E2	10	269		HPV16 L1	11	372
HPV16 E2	8	104		HPV16 L1	9	162
HPV16 E2	9	104		HPV16 L1	10	373
HPV16 E2	11	81		HPV16 L1	11	233
HPV16 E2	8	61		HPV16 L1	10	70
HPV16 E2	8	297		HPV16 L1	11	70
HPV16 E2	10	297		HPV16 L1	8	128
HPV16 E2	11	297		HPV16 L1	8	249
HPV16 E2	10	334		HPV16 L1	9	484
HPV16 E2	8	285		HPV16 L1	10	484
HPV16 E2	8	205		HPV16 L1	10	397
HPV16 E2	11	333		HPV16 L1	8	270
HPV16 E2	9	58		HPV16 L1	9	270
HPV16 E2	11	58		HPV16 L1	11	113
HPV16 E2	9	321		HPV16 L1	10	378
HPV16 E2	10	102		HPV16 L1	8	494
HPV16 E2	11	102		HPV16 L1	10	494
HPV16 E5	11	20		HPV16 L1	8	236
HPV16 E5	8	72		HPV16 L1	8	282

Table IX
HLA-A3 Supermotif Peptides

HPV16 L1	11	446	HPV16 L1	11	520
HPV16 L1	9	356	HPV16 L1	8	522
HPV16 L1	10	142	HPV16 L1	9	522
HPV16 L1	8	93	HPV16 L1	10	516
HPV16 L1	8	438	HPV16 L1	11	516
HPV16 L1	9	143	HPV16 L1	9	379
HPV16 L1	9	374	HPV16 L1	11	36
HPV16 L1	10	501	HPV16 L1	10	91
HPV16 L1	11	501	HPV16 L1	9	48
HPV16 L1	8	90	HPV16 L1	10	326
HPV16 L1	11	90	HPV16 L1	10	447
HPV16 L1	11	46	HPV16 L1	8	357
HPV16 L1	11	69	HPV16 L1	10	47
HPV16 L1	9	495	HPV16 L1	10	126
HPV16 L1	11	495	HPV16 L1	10	161
HPV16 L1	11	87	HPV16 L1	9	38
HPV16 L1	11	325	HPV16 L1	10	275
HPV16 L1	10	58	HPV16 L1	9	470
HPV16 L1	9	383	HPV16 L1	11	470
HPV16 L1	9	296	HPV16 L2	10	288
HPV16 L1	9	460	HPV16 L2	11	288
HPV16 L1	10	460	HPV16 L2	10	293
HPV16 L1	8	190	HPV16 L2	8	13
HPV16 L1	9	77	HPV16 L2	11	13
HPV16 L1	10	247	HPV16 L2	9	82
HPV16 L1	11	515	HPV16 L2	9	15
HPV16 L1	9	497	HPV16 L2	9	31
HPV16 L1	11	331	HPV16 L2	9	283
HPV16 L1	8	181	HPV16 L2	11	59
HPV16 L1	11	354	HPV16 L2	10	300
HPV16 L1	10	280	HPV16 L2	11	226
HPV16 L1	10	179	HPV16 L2	10	26
HPV16 L1	9	100	HPV16 L2	9	61
HPV16 L1	11	482	HPV16 L2	8	32
HPV16 L1	10	253	HPV16 L2	9	294
HPV16 L1	8	271	HPV16 L2	8	454
HPV16 L1	8	518	HPV16 L2	9	240
HPV16 L1	9	518	HPV16 L2	11	292
HPV16 L1	10	518	HPV16 L2	10	215
HPV16 L1	11	518	HPV16 L2	8	450
HPV16 L1	8	49	HPV16 L2	9	450
HPV16 L1	8	375	HPV16 L2	10	450
HPV16 L1	8	519	HPV16 L2	11	450
HPV16 L1	9	519	HPV16 L2	11	80
HPV16 L1	10	519	HPV16 L2	10	221
HPV16 L1	11	519	HPV16 L2	9	310
HPV16 L1	8	521	HPV16 L2	9	12
HPV16 L1	9	521	HPV16 L2	9	305
HPV16 L1	10	521	HPV16 L2	11	305
HPV16 L1	8	523	HPV16 L2	8	5
HPV16 L1	9	327	HPV16 L2	9	315
HPV16 L1	10	114	HPV16 L2	8	298
HPV16 L1	11	252	HPV16 L2	10	69
HPV16 L1	9	448	HPV16 L2	11	313
HPV16 L1	9	517	HPV16 L2	10	14
HPV16 L1	10	517	HPV16 L2	9	212
HPV16 L1	11	517	HPV16 L2	8	213
HPV16 L1	8	520	HPV16 L2	10	81
HPV16 L1	9	520	HPV16 L2	8	311
HPV16 L1	10	520	HPV16 L2	8	295

Table IX
HLA-A3 Supermotif Peptides

HPV16	L2	11	295	HPV18	E1	9	647
HPV16	L2	10	211	HPV18	E1	9	468
HPV16	L2	11	287	HPV18	E1	10	468
HPV16	L2	9	222	HPV18	E1	10	401
HPV16	L2	11	210	HPV18	E1	8	292
HPV16	L2	10	447	HPV18	E1	10	283
HPV16	L2	11	447	HPV18	E1	9	281
HPV16	L2	8	453	HPV18	E1	8	313
HPV16	L2	9	453	HPV18	E1	8	285
HPV16	L2	11	303	HPV18	E1	10	285
HPV16	L2	9	228	HPV18	E1	10	570
HPV18	E1	11	397	HPV18	E1	8	224
HPV18	E1	11	546	HPV18	E1	11	224
HPV18	E1	11	466	HPV18	E1	9	571
HPV18	E1	9	284	HPV18	E1	11	480
HPV18	E1	11	284	HPV18	E1	9	229
HPV18	E1	8	413	HPV18	E1	9	312
HPV18	E1	9	413	HPV18	E1	8	429
HPV18	E1	9	412	HPV18	E1	11	429
HPV18	E1	10	412	HPV18	E1	9	574
HPV18	E1	8	311	HPV18	E1	9	428
HPV18	E1	10	311	HPV18	E1	8	119
HPV18	E1	11	437	HPV18	E1	9	119
HPV18	E1	11	196	HPV18	E1	10	119
HPV18	E1	9	78	HPV18	E1	9	393
HPV18	E1	10	78	HPV18	E1	9	551
HPV18	E1	11	78	HPV18	E1	8	252
HPV18	E1	8	203	HPV18	E1	8	607
HPV18	E1	10	228	HPV18	E1	11	607
HPV18	E1	11	391	HPV18	E1	11	200
HPV18	E1	11	637	HPV18	E1	9	426
HPV18	E1	8	342	HPV18	E1	11	426
HPV18	E1	8	610	HPV18	E1	8	80
HPV18	E1	9	115	HPV18	E1	9	80
HPV18	E1	10	115	HPV18	E1	11	102
HPV18	E1	10	309	HPV18	E1	11	320
HPV18	E1	9	104	HPV18	E1	8	117
HPV18	E1	9	460	HPV18	E1	10	117
HPV18	E1	10	463	HPV18	E1	11	117
HPV18	E1	8	470	HPV18	E1	10	321
HPV18	E1	9	399	HPV18	E1	10	93
HPV18	E1	9	226	HPV18	E1	9	322
HPV18	E1	8	465	HPV18	E1	10	197
HPV18	E1	8	212	HPV18	E1	8	414
HPV18	E1	9	223	HPV18	E1	11	414
HPV18	E1	11	92	HPV18	E1	8	572
HPV18	E1	9	279	HPV18	E1	11	572
HPV18	E1	11	279	HPV18	E1	8	323
HPV18	E1	11	249	HPV18	E1	8	81
HPV18	E1	8	270	HPV18	E1	8	280
HPV18	E1	9	198	HPV18	E1	10	280
HPV18	E1	8	282	HPV18	E1	11	339
HPV18	E1	11	282	HPV18	E1	8	432
HPV18	E1	11	569	HPV18	E1	9	516
HPV18	E1	8	552	HPV18	E1	9	536
HPV18	E1	8	116	HPV18	E1	10	268
HPV18	E1	9	116	HPV18	E1	10	408
HPV18	E1	11	116	HPV18	E1	8	19
HPV18	E1	8	461	HPV18	E1	9	19
HPV18	E1	9	439	HPV18	E2	9	269

Table IX
HLA-A3 Supermotif Peptides

HPV18	E2	10	269	HPV18	E2	10	157
HPV18	E2	11	269	HPV18	E2	9	335
HPV18	E2	9	82	HPV18	E2	11	335
HPV18	E2	11	82	HPV18	E2	9	62
HPV18	E2	8	270	HPV18	E2	11	62
HPV18	E2	9	270	HPV18	E2	8	322
HPV18	E2	10	270	HPV18	E2	10	173
HPV18	E2	11	270	HPV18	E2	10	143
HPV18	E2	8	301	HPV18	E2	11	228
HPV18	E2	11	156	HPV18	E6	9	68
HPV18	E2	11	31	HPV18	E6	10	27
HPV18	E2	10	210	HPV18	E6	10	58
HPV18	E2	10	268	HPV18	E6	10	83
HPV18	E2	11	268	HPV18	E6	8	29
HPV18	E2	8	85	HPV18	E6	11	40
HPV18	E2	10	291	HPV18	E6	8	43
HPV18	E2	8	338	HPV18	E6	11	47
HPV18	E2	10	19	HPV18	E6	8	97
HPV18	E2	8	289	HPV18	E6	11	97
HPV18	E2	8	68	HPV18	E6	8	139
HPV18	E2	11	18	HPV18	E6	11	139
HPV18	E2	9	152	HPV18	E6	8	117
HPV18	E2	11	238	HPV18	E6	9	117
HPV18	E2	11	8	HPV18	E6	10	117
HPV18	E2	11	333	HPV18	E6	9	102
HPV18	E2	10	81	HPV18	E6	10	101
HPV18	E2	9	144	HPV18	E6	10	41
HPV18	E2	8	44	HPV18	E6	9	1
HPV18	E2	9	67	HPV18	E6	10	1
HPV18	E2	9	297	HPV18	E6	8	100
HPV18	E2	11	297	HPV18	E6	11	100
HPV18	E2	9	107	HPV18	E6	10	95
HPV18	E2	10	107	HPV18	E6	11	114
HPV18	E2	8	170	HPV18	E6	9	111
HPV18	E2	9	285	HPV18	E6	9	144
HPV18	E2	9	64	HPV18	E6	10	144
HPV18	E2	9	288	HPV18	E6	11	144
HPV18	E2	8	272	HPV18	E6	9	59
HPV18	E2	9	272	HPV18	E6	9	84
HPV18	E2	9	33	HPV18	E6	8	72
HPV18	E2	11	80	HPV18	E7	9	63
HPV18	E2	10	2	HPV18	E7	11	63
HPV18	E2	11	119	HPV18	E7	8	77
HPV18	E2	10	61	HPV18	E7	10	43
HPV18	E2	8	122	HPV18	E7	11	43
HPV18	E2	10	305	HPV18	E7	11	48
HPV18	E2	8	11	HPV18	E7	9	59
HPV18	E2	8	298	HPV18	E7	11	74
HPV18	E2	10	298	HPV18	E7	11	61
HPV18	E2	11	298	HPV18	E7	9	50
HPV18	E2	10	229	HPV18	E7	8	60
HPV18	E2	9	230	HPV18	E7	10	75
HPV18	E2	8	153	HPV18	L1	11	195
HPV18	E2	8	286	HPV18	L1	8	225
HPV18	E2	11	286	HPV18	L1	11	268
HPV18	E2	10	120	HPV18	L1	9	419
HPV18	E2	9	211	HPV18	L1	10	196
HPV18	E2	8	231	HPV18	L1	9	552
HPV18	E2	10	334	HPV18	L1	10	552
HPV18	E2	8	212	HPV18	L1	8	163

Table IX
HLA-A3 Supermotif Peptides

HPV18 L1	11	222	HPV18 L1	9	555
HPV18 L1	10	310	HPV18 L1	11	555
HPV18 L1	8	493	HPV18 L1	8	485
HPV18 L1	10	418	HPV18 L1	9	362
HPV18 L1	8	284	HPV18 L1	11	92
HPV18 L1	11	122	HPV18 L1	10	149
HPV18 L1	9	520	HPV18 L1	8	474
HPV18 L1	10	520	HPV18 L1	9	197
HPV18 L1	8	305	HPV18 L1	8	554
HPV18 L1	9	305	HPV18 L1	10	554
HPV18 L1	11	148	HPV18 L1	9	473
HPV18 L1	10	330	HPV18 L1	8	553
HPV18 L1	11	203	HPV18 L1	9	553
HPV18 L1	8	317	HPV18 L1	11	553
HPV18 L1	8	59	HPV18 L1	8	105
HPV18 L1	8	530	HPV18 L1	9	331
HPV18 L1	9	530	HPV18 L1	11	71
HPV18 L1	10	530	HPV18 L1	10	126
HPV18 L1	8	271	HPV18 L1	10	361
HPV18 L1	11	482	HPV18 L1	10	161
HPV18 L1	11	535	HPV18 L1	8	230
HPV18 L1	10	177	HPV18 L1	10	230
HPV18 L1	11	360	HPV18 L1	9	73
HPV18 L1	10	505	HPV18 L2	10	286
HPV18 L1	8	125	HPV18 L2	8	12
HPV18 L1	11	125	HPV18 L2	11	12
HPV18 L1	10	103	HPV18 L2	11	354
HPV18 L1	9	178	HPV18 L2	9	273
HPV18 L1	9	104	HPV18 L2	11	109
HPV18 L1	8	531	HPV18 L2	9	260
HPV18 L1	9	531	HPV18 L2	8	443
HPV18 L1	10	496	HPV18 L2	9	276
HPV18 L1	9	224	HPV18 L2	11	306
HPV18 L1	8	558	HPV18 L2	11	58
HPV18 L1	10	558	HPV18 L2	10	25
HPV18 L1	11	558	HPV18 L2	9	60
HPV18 L1	10	57	HPV18 L2	11	292
HPV18 L1	10	282	HPV18 L2	10	210
HPV18 L1	10	16	HPV18 L2	11	210
HPV18 L1	8	550	HPV18 L2	10	34
HPV18 L1	11	550	HPV18 L2	9	287
HPV18 L1	8	540	HPV18 L2	8	1
HPV18 L1	10	472	HPV18 L2	9	1
HPV18 L1	10	412	HPV18 L2	10	1
HPV18 L1	10	315	HPV18 L2	11	1
HPV18 L1	11	366	HPV18 L2	10	79
HPV18 L1	9	484	HPV18 L2	11	285
HPV18 L1	11	102	HPV18 L2	8	357
HPV18 L1	11	547	HPV18 L2	11	209
HPV18 L1	9	112	HPV18 L2	8	439
HPV18 L1	9	135	HPV18 L2	9	439
HPV18 L1	8	561	HPV18 L2	10	439
HPV18 L1	10	548	HPV18 L2	11	439
HPV18 L1	10	551	HPV18 L2	10	216
HPV18 L1	11	551	HPV18 L2	11	258
HPV18 L1	9	127	HPV18 L2	9	11
HPV18 L1	10	93	HPV18 L2	11	298
HPV18 L1	9	150	HPV18 L2	10	281
HPV18 L1	11	518	HPV18 L2	11	281
HPV18 L1	8	306	HPV18 L2	9	308

Table IX
HLA-A3 Supermotif Peptides

HPV18	L2	10	364	HPV31	E1	9	157
HPV18	L2	10	68	HPV31	E1	8	386
HPV18	L2	10	220	HPV31	E1	9	386
HPV18	L2	9	211	HPV31	E1	8	225
HPV18	L2	10	211	HPV31	E1	9	196
HPV18	L2	10	110	HPV31	E1	11	222
HPV18	L2	8	212	HPV31	E1	9	78
HPV18	L2	9	212	HPV31	E1	10	78
HPV18	L2	9	365	HPV31	E1	11	78
HPV18	L2	10	235	HPV31	E1	11	162
HPV18	L2	10	13	HPV31	E1	8	478
HPV18	L2	9	111	HPV31	E1	11	453
HPV18	L2	8	288	HPV31	E1	11	174
HPV18	L2	11	288	HPV31	E1	9	268
HPV18	L2	8	261	HPV31	E1	9	544
HPV18	L2	8	366	HPV31	E1	10	381
HPV18	L2	10	293	HPV31	E1	9	184
HPV18	L2	9	217	HPV31	E1	10	110
HPV18	L2	9	80	HPV31	E1	11	380
HPV18	L2	9	221	HPV31	E1	9	441
HPV18	L2	9	236	HPV31	E1	10	441
HPV18	L2	8	2	HPV31	E1	10	590
HPV18	L2	9	2	HPV31	E1	10	374
HPV18	L2	10	2	HPV31	E1	9	412
HPV18	L2	11	234	HPV31	E1	10	454
HPV18	L2	9	14	HPV31	E1	8	286
HPV18	L2	8	81	HPV31	E1	9	202
HPV18	L2	8	112	HPV31	E1	10	543
HPV18	L2	11	436	HPV31	E1	11	542
HPV31	E1	8	296	HPV31	E1	10	256
HPV31	E1	8	185	HPV31	E1	9	437
HPV31	E1	9	111	HPV31	E1	8	258
HPV31	E1	11	439	HPV31	E1	10	258
HPV31	E1	8	81	HPV31	E1	9	285
HPV31	E1	11	370	HPV31	E1	8	255
HPV31	E1	10	263	HPV31	E1	11	255
HPV31	E1	10	113	HPV31	E1	9	257
HPV31	E1	11	113	HPV31	E1	11	257
HPV31	E1	9	477	HPV31	E1	8	400
HPV31	E1	8	284	HPV31	E1	10	400
HPV31	E1	10	284	HPV31	E1	8	253
HPV31	E1	9	100	HPV31	E1	10	253
HPV31	E1	11	100	HPV31	E1	9	547
HPV31	E1	8	620	HPV31	E1	8	601
HPV31	E1	11	364	HPV31	E1	8	117
HPV31	E1	9	366	HPV31	E1	8	376
HPV31	E1	11	528	HPV31	E1	10	170
HPV31	E1	11	348	HPV31	E1	9	524
HPV31	E1	8	80	HPV31	E1	8	580
HPV31	E1	9	80	HPV31	E1	11	580
HPV31	E1	10	201	HPV31	E1	9	399
HPV31	E1	8	583	HPV31	E1	11	399
HPV31	E1	8	315	HPV31	E1	9	176
HPV31	E1	8	443	HPV31	E1	10	267
HPV31	E1	9	372	HPV31	E1	10	599
HPV31	E1	10	436	HPV31	E1	11	293
HPV31	E1	11	566	HPV31	E1	8	438
HPV31	E1	9	433	HPV31	E1	9	401
HPV31	E1	9	252	HPV31	E1	11	98
HPV31	E1	11	252	HPV31	E1	10	294

Table IX
HLA-A3 Supermotif Peptides

HPV31	E1	11	281		HPV31	E2	9	127
HPV31	E1	9	295		HPV31	E2	8	219
HPV31	E1	8	269		HPV31	E2	9	60
HPV31	E1	8	387		HPV31	E2	10	290
HPV31	E1	11	387		HPV31	E2	10	57
HPV31	E1	11	180		HPV31	E2	8	238
HPV31	E1	8	545		HPV31	E2	10	238
HPV31	E1	11	545		HPV31	E2	10	25
HPV31	E1	8	177		HPV31	E2	9	37
HPV31	E1	10	349		HPV31	E2	11	37
HPV31	E1	9	254		HPV31	E2	8	7
HPV31	E1	8	413		HPV31	E2	10	276
HPV31	E1	8	434		HPV31	E2	11	324
HPV31	E1	8	197		HPV31	E2	11	216
HPV31	E1	8	525		HPV31	E2	8	104
HPV31	E1	10	223		HPV31	E2	9	104
HPV31	E1	8	405		HPV31	E2	8	81
HPV31	E1	9	489		HPV31	E2	10	341
HPV31	E1	8	19		HPV31	E2	8	128
HPV31	E2	9	277		HPV31	E2	8	292
HPV31	E2	8	278		HPV31	E2	8	240
HPV31	E2	9	229		HPV31	E2	10	146
HPV31	E2	10	229		HPV31	E2	11	340
HPV31	E2	8	61		HPV31	E2	9	147
HPV31	E2	9	291		HPV31	E2	9	58
HPV31	E2	9	239		HPV31	E2	11	58
HPV31	E2	10	228		HPV31	E2	9	328
HPV31	E2	11	228		HPV31	E2	10	102
HPV31	E2	8	307		HPV31	E2	11	102
HPV31	E2	10	307		HPV31	E5	11	20
HPV31	E2	11	145		HPV31	E5	11	48
HPV31	E2	8	40		HPV31	E5	9	22
HPV31	E2	9	301		HPV31	E5	8	51
HPV31	E2	11	301		HPV31	E5	10	21
HPV31	E2	9	174		HPV31	E5	9	50
HPV31	E2	10	174		HPV31	E6	10	18
HPV31	E2	10	204		HPV31	E6	9	136
HPV31	E2	9	80		HPV31	E6	10	63
HPV31	E2	9	168		HPV31	E6	11	98
HPV31	E2	10	168		HPV31	E6	9	57
HPV31	E2	8	231		HPV31	E6	8	20
HPV31	E2	10	235		HPV31	E6	10	25
HPV31	E2	11	235		HPV31	E6	11	45
HPV31	E2	9	29		HPV31	E6	9	47
HPV31	E2	11	35		HPV31	E6	8	95
HPV31	E2	10	297		HPV31	E6	10	85
HPV31	E2	10	15		HPV31	E6	8	61
HPV31	E2	11	15		HPV31	E6	8	137
HPV31	E2	8	304		HPV31	E6	9	72
HPV31	E2	11	304		HPV31	E6	9	100
HPV31	E2	11	275		HPV31	E6	10	99
HPV31	E2	9	205		HPV31	E6	9	127
HPV31	E2	11	14		HPV31	E6	9	109
HPV31	E2	11	4		HPV31	E6	8	27
HPV31	E2	9	103		HPV31	E6	11	17
HPV31	E2	10	103		HPV31	E6	9	82
HPV31	E2	9	342		HPV31	E6	8	87
HPV31	E2	11	78		HPV31	E6	9	86
HPV31	E2	9	303		HPV31	E6	8	73
HPV31	E2	10	254		HPV31	E6	10	132

Table IX
HLA-A3 Supermotif Peptides

HPV31	E6	11	132		HPV31	L1	11	472
HPV31	E6	8	70		HPV31	L1	11	306
HPV31	E6	11	70		HPV31	L1	8	156
HPV31	E6	10	81		HPV31	L1	11	329
HPV31	E7	10	68		HPV31	L1	10	255
HPV31	E7	10	88		HPV31	L1	10	154
HPV31	E7	9	89		HPV31	L1	10	476
HPV31	E7	9	54		HPV31	L1	11	476
HPV31	E7	10	53		HPV31	L1	9	75
HPV31	E7	8	70		HPV31	L1	11	457
HPV31	E7	8	55		HPV31	L1	9	490
HPV31	L1	11	347		HPV31	L1	10	490
HPV31	L1	10	348		HPV31	L1	11	490
HPV31	L1	11	426		HPV31	L1	10	228
HPV31	L1	11	208		HPV31	L1	9	51
HPV31	L1	8	491		HPV31	L1	10	51
HPV31	L1	9	491		HPV31	L1	9	358
HPV31	L1	10	491		HPV31	L1	8	23
HPV31	L1	11	491		HPV31	L1	8	492
HPV31	L1	8	103		HPV31	L1	9	492
HPV31	L1	8	224		HPV31	L1	10	492
HPV31	L1	9	459		HPV31	L1	9	271
HPV31	L1	10	459		HPV31	L1	8	246
HPV31	L1	10	372		HPV31	L1	9	302
HPV31	L1	8	245		HPV31	L1	10	89
HPV31	L1	9	245		HPV31	L1	9	423
HPV31	L1	11	88		HPV31	L1	9	354
HPV31	L1	10	353		HPV31	L1	8	494
HPV31	L1	10	270		HPV31	L1	10	494
HPV31	L1	8	469		HPV31	L1	11	494
HPV31	L1	10	469		HPV31	L1	8	493
HPV31	L1	8	211		HPV31	L1	9	493
HPV31	L1	8	257		HPV31	L1	11	493
HPV31	L1	11	421		HPV31	L1	11	44
HPV31	L1	9	331		HPV31	L1	11	10
HPV31	L1	10	117		HPV31	L1	10	66
HPV31	L1	8	68		HPV31	L1	9	22
HPV31	L1	10	68		HPV31	L1	10	301
HPV31	L1	8	413		HPV31	L1	10	422
HPV31	L1	9	349		HPV31	L1	8	332
HPV31	L1	9	118		HPV31	L1	11	62
HPV31	L1	10	427		HPV31	L1	10	21
HPV31	L1	10	357		HPV31	L1	10	101
HPV31	L1	8	431		HPV31	L1	10	136
HPV31	L1	8	65		HPV31	L1	9	12
HPV31	L1	11	65		HPV31	L1	10	250
HPV31	L1	11	20		HPV31	L1	10	50
HPV31	L1	9	470		HPV31	L1	11	50
HPV31	L1	11	470		HPV31	L1	9	445
HPV31	L1	11	300		HPV31	L1	11	445
HPV31	L1	10	32		HPV31	L2	10	281
HPV31	L1	11	227		HPV31	L2	11	281
HPV31	L1	8	496		HPV31	L2	10	286
HPV31	L1	9	496		HPV31	L2	11	13
HPV31	L1	8	165		HPV31	L2	9	15
HPV31	L1	10	222		HPV31	L2	9	276
HPV31	L1	11	489		HPV31	L2	11	59
HPV31	L1	10	411		HPV31	L2	11	221
HPV31	L1	9	472		HPV31	L2	9	61
					HPV31	L2	10	26

Table IX
HLA-A3 Supermotif Peptides

HPV31 L2	10	38		HPV33 E1	11	377
HPV31 L2	11	280		HPV33 E1	10	566
HPV31 L2	11	205		HPV33 E1	11	541
HPV31 L2	9	287		HPV33 E1	11	99
HPV31 L2	8	447		HPV33 E1	9	537
HPV31 L2	11	292		HPV33 E1	10	214
HPV31 L2	11	285		HPV33 E1	8	242
HPV31 L2	9	217		HPV33 E1	10	295
HPV31 L2	10	210		HPV33 E1	8	19
HPV31 L2	8	443		HPV33 E1	9	19
HPV31 L2	9	443		HPV33 E1	10	449
HPV31 L2	10	443		HPV33 E1	8	456
HPV31 L2	11	443		HPV33 E1	9	385
HPV31 L2	8	235		HPV33 E1	9	212
HPV31 L2	9	298		HPV33 E1	9	446
HPV31 L2	11	298		HPV33 E1	10	446
HPV31 L2	9	308		HPV33 E1	8	451
HPV31 L2	8	2		HPV33 E1	9	265
HPV31 L2	10	2		HPV33 E1	11	265
HPV31 L2	11	2		HPV33 E1	8	399
HPV31 L2	8	5		HPV33 E1	9	399
HPV31 L2	10	69		HPV33 E1	9	209
HPV31 L2	11	306		HPV33 E1	11	235
HPV31 L2	10	14		HPV33 E1	9	480
HPV31 L2	9	207		HPV33 E1	9	327
HPV31 L2	10	207		HPV33 E1	9	256
HPV31 L2	8	208		HPV33 E1	10	573
HPV31 L2	9	208		HPV33 E1	8	266
HPV31 L2	11	80		HPV33 E1	10	266
HPV31 L2	8	40		HPV33 E1	9	267
HPV31 L2	8	288		HPV33 E1	8	268
HPV31 L2	11	288		HPV33 E1	11	268
HPV31 L2	10	206		HPV33 E1	8	400
HPV31 L2	11	206		HPV33 E1	11	400
HPV31 L2	9	39		HPV33 E1	8	210
HPV31 L2	10	293		HPV33 E1	11	210
HPV31 L2	11	232		HPV33 E1	8	538
HPV31 L2	9	82		HPV33 E1	11	187
HPV31 L2	10	440		HPV33 E1	10	236
HPV31 L2	11	440		HPV33 E1	11	520
HPV31 L2	8	446		HPV33 E1	10	394
HPV31 L2	9	446		HPV33 E1	9	197
HPV31 L2	9	223		HPV33 E1	11	393
HPV31 L2	11	296		HPV33 E1	10	612
HPV33 E1	8	96		HPV33 E1	11	412
HPV33 E1	11	383		HPV33 E1	10	603
HPV33 E1	11	104		HPV33 E1	10	387
HPV33 E1	8	596		HPV33 E1	9	425
HPV33 E1	8	81		HPV33 E1	10	467
HPV33 E1	8	297		HPV33 E1	8	271
HPV33 E1	10	297		HPV33 E1	10	271
HPV33 E1	8	633		HPV33 E1	9	270
HPV33 E1	11	633		HPV33 E1	11	270
HPV33 E1	10	276		HPV33 E1	10	269
HPV33 E1	9	490		HPV33 E1	9	215
HPV33 E1	8	614		HPV33 E1	11	466
HPV33 E1	9	78		HPV33 E1	10	413
HPV33 E1	10	78		HPV33 E1	8	481
HPV33 E1	11	78		HPV33 E1	9	298
				HPV33 E1	8	80

Table IX
HLA-A3 Supermotif Peptides

Protein				Protein		
HPV33	E1	9	80	HPV33	E2	11	284
HPV33	E1	11	57	HPV33	E2	9	272
HPV33	E1	9	379	HPV33	E2	9	248
HPV33	E1	8	389	HPV33	E2	9	60
HPV33	E1	9	195	HPV33	E2	8	27
HPV33	E1	11	195	HPV33	E2	11	27
HPV33	E1	9	560	HPV33	E2	8	222
HPV33	E1	9	189	HPV33	E2	9	29
HPV33	E1	8	238	HPV33	E2	9	76
HPV33	E1	11	593	HPV33	E2	8	332
HPV33	E1	8	60	HPV33	E2	10	57
HPV33	E1	10	94	HPV33	E2	8	7
HPV33	E1	9	308	HPV33	E2	11	37
HPV33	E1	8	575	HPV33	E2	9	256
HPV33	E1	11	306	HPV33	E2	11	256
HPV33	E1	8	109	HPV33	E2	10	5
HPV33	E1	9	95	HPV33	E2	11	98
HPV33	E1	10	634	HPV33	E2	8	285
HPV33	E1	9	414	HPV33	E2	10	285
HPV33	E1	11	111	HPV33	E2	8	61
HPV33	E1	10	58	HPV33	E2	11	270
HPV33	E1	11	193	HPV33	E2	11	304
HPV33	E1	11	239	HPV33	E2	10	305
HPV33	E1	8	447	HPV33	E2	11	209
HPV33	E1	9	447	HPV33	E2	11	254
HPV33	E1	11	558	HPV33	E2	8	257
HPV33	E1	8	328	HPV33	E2	10	257
HPV33	E1	10	240	HPV33	E2	8	310
HPV33	E1	8	299	HPV33	E2	10	233
HPV33	E1	8	491	HPV33	E2	8	118
HPV33	E1	8	190	HPV33	E2	9	118
HPV33	E1	10	100	HPV33	E2	10	116
HPV33	E1	8	418	HPV33	E2	11	116
HPV33	E1	9	502	HPV33	E2	8	273
HPV33	E1	9	522	HPV33	E2	9	117
HPV33	E1	9	595	HPV33	E2	10	117
HPV33	E1	11	254	HPV33	E2	9	58
HPV33	E2	8	249	HPV33	E2	11	58
HPV33	E2	9	258	HPV33	E2	10	102
HPV33	E2	9	245	HPV33	E2	11	102
HPV33	E2	8	40	HPV33	E2	9	309
HPV33	E2	10	288	HPV33	E2	11	159
HPV33	E2	9	211	HPV33	E5	9	12
HPV33	E2	10	25	HPV33	E5	11	10
HPV33	E2	8	235	HPV33	E5	11	38
HPV33	E2	9	143	HPV33	E5	9	40
HPV33	E2	11	232	HPV33	E6	8	137
HPV33	E2	11	74	HPV33	E6	9	137
HPV33	E2	9	282	HPV33	E6	8	136
HPV33	E2	11	282	HPV33	E6	9	136
HPV33	E2	11	115	HPV33	E6	10	136
HPV33	E2	9	100	HPV33	E6	10	30
HPV33	E2	10	156	HPV33	E6	11	98
HPV33	E2	10	278	HPV33	E6	8	27
HPV33	E2	9	15	HPV33	E6	9	27
HPV33	E2	11	4	HPV33	E6	9	47
HPV33	E2	10	14	HPV33	E6	11	45
HPV33	E2	8	165	HPV33	E6	9	69
HPV33	E2	8	77	HPV33	E6	8	61
HPV33	E2	9	284	HPV33	E6	10	99

Table IX
HLA-A3 Supermotif Peptides

HPV33	E6	8	128	HPV33	L1	11	468
HPV33	E6	9	64	HPV33	L1	11	62
HPV33	E6	9	100	HPV33	L1	11	299
HPV33	E6	8	70	HPV33	L1	9	57
HPV33	E6	10	25	HPV33	L1	10	221
HPV33	E6	11	25	HPV33	L1	10	409
HPV33	E6	9	127	HPV33	L1	8	165
HPV33	E6	8	86	HPV33	L1	11	55
HPV33	E6	9	86	HPV33	L1	10	484
HPV33	E6	8	109	HPV33	L1	11	484
HPV33	E6	9	109	HPV33	L1	9	470
HPV33	E6	8	95	HPV33	L1	11	470
HPV33	E6	8	87	HPV33	L1	8	156
HPV33	E6	10	132	HPV33	L1	11	305
HPV33	E7	10	68	HPV33	L1	10	254
HPV33	E7	11	30	HPV33	L1	10	154
HPV33	E7	8	59	HPV33	L1	11	328
HPV33	E7	8	70	HPV33	L1	9	347
HPV33	E7	10	31	HPV33	L1	8	481
HPV33	L1	11	424	HPV33	L1	8	488
HPV33	L1	8	411	HPV33	L1	9	488
HPV33	L1	10	44	HPV33	L1	11	488
HPV33	L1	9	270	HPV33	L1	9	75
HPV33	L1	11	207	HPV33	L1	11	455
HPV33	L1	11	345	HPV33	L1	8	491
HPV33	L1	8	103	HPV33	L1	9	491
HPV33	L1	8	223	HPV33	L1	9	410
HPV33	L1	9	457	HPV33	L1	9	51
HPV33	L1	10	457	HPV33	L1	10	51
HPV33	L1	10	370	HPV33	L1	10	32
HPV33	L1	8	244	HPV33	L1	8	245
HPV33	L1	9	244	HPV33	L1	9	490
HPV33	L1	10	351	HPV33	L1	10	490
HPV33	L1	10	202	HPV33	L1	10	227
HPV33	L1	11	88	HPV33	L1	8	23
HPV33	L1	10	269	HPV33	L1	8	486
HPV33	L1	8	467	HPV33	L1	9	486
HPV33	L1	10	467	HPV33	L1	10	486
HPV33	L1	10	249	HPV33	L1	11	486
HPV33	L1	10	50	HPV33	L1	9	352
HPV33	L1	11	50	HPV33	L1	9	301
HPV33	L1	8	256	HPV33	L1	10	89
HPV33	L1	11	419	HPV33	L1	11	31
HPV33	L1	9	330	HPV33	L1	9	421
HPV33	L1	10	117	HPV33	L1	8	489
HPV33	L1	9	472	HPV33	L1	10	489
HPV33	L1	10	472	HPV33	L1	11	489
HPV33	L1	8	68	HPV33	L1	9	485
HPV33	L1	10	68	HPV33	L1	10	485
HPV33	L1	11	226	HPV33	L1	11	485
HPV33	L1	9	118	HPV33	L1	11	10
HPV33	L1	10	425	HPV33	L1	10	66
HPV33	L1	8	474	HPV33	L1	9	22
HPV33	L1	11	478	HPV33	L1	8	348
HPV33	L1	8	429	HPV33	L1	10	300
HPV33	L1	8	65	HPV33	L1	10	420
HPV33	L1	11	65	HPV33	L1	8	331
HPV33	L1	11	20	HPV33	L1	10	21
HPV33	L1	11	43	HPV33	L1	10	101
HPV33	L1	9	468	HPV33	L1	9	12

Table IX
HLA-A3 Supermotif Peptides

HPV33	L1	9	443		HPV45	E1	9	270
HPV33	L1	11	443		HPV45	E1	11	270
HPV33	L2	9	81		HPV45	E1	8	399
HPV33	L2	8	82		HPV45	E1	9	399
HPV33	L2	10	291		HPV45	E1	9	398
HPV33	L2	10	286		HPV45	E1	10	398
HPV33	L2	11	286		HPV45	E1	8	297
HPV33	L2	11	12		HPV45	E1	10	297
HPV33	L2	9	308		HPV45	E1	11	423
HPV33	L2	9	14		HPV45	E1	8	634
HPV33	L2	8	447		HPV45	E1	9	78
HPV33	L2	9	447		HPV45	E1	10	78
HPV33	L2	9	281		HPV45	E1	11	78
HPV33	L2	11	301		HPV45	E1	10	214
HPV33	L2	11	440		HPV45	E1	11	623
HPV33	L2	11	58		HPV45	E1	8	328
HPV33	L2	11	226		HPV45	E1	8	596
HPV33	L2	10	37		HPV45	E1	9	115
HPV33	L2	10	25		HPV45	E1	10	115
HPV33	L2	9	60		HPV45	E1	11	186
HPV33	L2	10	379		HPV45	E1	8	189
HPV33	L2	11	297		HPV45	E1	9	189
HPV33	L2	11	285		HPV45	E1	10	295
HPV33	L2	8	448		HPV45	E1	9	446
HPV33	L2	9	292		HPV45	E1	8	456
HPV33	L2	10	307		HPV45	E1	9	385
HPV33	L2	11	311		HPV45	E1	10	449
HPV33	L2	9	240		HPV45	E1	9	212
HPV33	L2	11	290		HPV45	E1	11	579
HPV33	L2	10	215		HPV45	E1	8	19
HPV33	L2	8	444		HPV45	E1	9	19
HPV33	L2	9	444		HPV45	E1	8	626
HPV33	L2	10	444		HPV45	E1	9	209
HPV33	L2	11	444		HPV45	E1	9	443
HPV33	L2	11	79		HPV45	E1	9	265
HPV33	L2	10	221		HPV45	E1	11	265
HPV33	L2	9	313		HPV45	E1	11	235
HPV33	L2	9	303		HPV45	E1	8	256
HPV33	L2	11	303		HPV45	E1	8	268
HPV33	L2	10	13		HPV45	E1	11	268
HPV33	L2	9	212		HPV45	E1	11	555
HPV33	L2	9	38		HPV45	E1	11	466
HPV33	L2	8	213		HPV45	E1	8	447
HPV33	L2	10	80		HPV45	E1	8	538
HPV33	L2	8	39		HPV45	E1	8	116
HPV33	L2	8	309		HPV45	E1	9	116
HPV33	L2	8	293		HPV45	E1	11	116
HPV33	L2	11	293		HPV45	E1	9	197
HPV33	L2	10	211		HPV45	E1	9	425
HPV33	L2	10	298		HPV45	E1	10	387
HPV33	L2	9	222		HPV45	E1	10	269
HPV33	L2	10	441		HPV45	E1	8	299
HPV33	L2	11	441		HPV45	E1	9	267
HPV33	L2	11	210		HPV45	E1	11	84
HPV33	L2	9	228		HPV45	E1	8	190
HPV33	L2	8	381		HPV45	E1	8	271
HPV45	E1	11	383		HPV45	E1	10	271
HPV45	E1	8	198		HPV45	E1	10	556
HPV45	E1	11	532		HPV45	E1	10	467
HPV45	E1	11	452		HPV45	E1	8	210

Table IX
HLA-A3 Supermotif Peptides

HPV45	E1	11	210	HPV45	E2	9	242
HPV45	E1	10	103	HPV45	E2	11	242
HPV45	E1	9	557	HPV45	E2	10	295
HPV45	E1	9	215	HPV45	E2	8	124
HPV45	E1	9	298	HPV45	E2	8	293
HPV45	E1	8	415	HPV45	E2	10	21
HPV45	E1	11	415	HPV45	E2	8	70
HPV45	E1	9	560	HPV45	E2	8	36
HPV45	E1	9	414	HPV45	E2	9	146
HPV45	E1	8	119	HPV45	E2	10	77
HPV45	E1	9	119	HPV45	E2	11	20
HPV45	E1	10	119	HPV45	E2	9	232
HPV45	E1	9	379	HPV45	E2	11	121
HPV45	E1	9	537	HPV45	E2	10	272
HPV45	E1	8	238	HPV45	E2	11	272
HPV45	E1	8	593	HPV45	E2	11	10
HPV45	E1	11	593	HPV45	E2	8	256
HPV45	E1	11	102	HPV45	E2	11	336
HPV45	E1	9	412	HPV45	E2	10	83
HPV45	E1	11	412	HPV45	E2	8	46
HPV45	E1	8	80	HPV45	E2	9	69
HPV45	E1	9	80	HPV45	E2	9	301
HPV45	E1	8	451	HPV45	E2	11	301
HPV45	E1	11	306	HPV45	E2	11	33
HPV45	E1	8	117	HPV45	E2	9	109
HPV45	E1	10	117	HPV45	E2	10	109
HPV45	E1	11	117	HPV45	E2	9	289
HPV45	E1	10	307	HPV45	E2	9	292
HPV45	E1	9	308	HPV45	E2	8	67
HPV45	E1	9	104	HPV45	E2	11	67
HPV45	E1	8	558	HPV45	E2	11	271
HPV45	E1	11	558	HPV45	E2	10	112
HPV45	E1	11	239	HPV45	E2	9	35
HPV45	E1	8	309	HPV45	E2	11	222
HPV45	E1	10	240	HPV45	E2	11	82
HPV45	E1	8	81	HPV45	E2	9	244
HPV45	E1	8	266	HPV45	E2	10	4
HPV45	E1	10	266	HPV45	E2	10	63
HPV45	E1	8	400	HPV45	E2	11	43
HPV45	E1	11	400	HPV45	E2	8	13
HPV45	E1	11	325	HPV45	E2	8	302
HPV45	E1	8	418	HPV45	E2	10	302
HPV45	E1	9	502	HPV45	E2	11	302
HPV45	E1	9	522	HPV45	E2	8	275
HPV45	E1	10	254	HPV45	E2	9	275
HPV45	E1	10	394	HPV45	E2	10	275
HPV45	E2	9	78	HPV45	E2	11	321
HPV45	E2	9	84	HPV45	E2	8	276
HPV45	E2	8	305	HPV45	E2	9	276
HPV45	E2	8	274	HPV45	E2	10	322
HPV45	E2	9	274	HPV45	E2	9	51
HPV45	E2	10	274	HPV45	E2	8	233
HPV45	E2	11	274	HPV45	E2	8	277
HPV45	E2	11	158	HPV45	E2	8	290
HPV45	E2	9	171	HPV45	E2	11	290
HPV45	E2	10	212	HPV45	E2	8	172
HPV45	E2	10	50	HPV45	E2	10	122
HPV45	E2	9	255	HPV45	E2	9	213
HPV45	E2	8	225	HPV45	E2	10	337
HPV45	E2	8	242	HPV45	E2	8	214

Table IX
HLA-A3 Supermotif Peptides

HPV45	E2	10	159	HPV45	L1	11	518
HPV45	E2	9	338	HPV45	L1	10	162
HPV45	E2	9	64	HPV45	L1	8	164
HPV45	E2	11	64	HPV45	L1	11	88
HPV45	E2	10	145	HPV45	L1	10	276
HPV45	E2	10	175	HPV45	L1	8	129
HPV45	E6	9	59	HPV45	L1	11	188
HPV45	E6	9	68	HPV45	L1	8	250
HPV45	E6	10	32	HPV45	L1	9	488
HPV45	E6	10	27	HPV45	L1	10	488
HPV45	E6	8	97	HPV45	L1	8	271
HPV45	E6	11	97	HPV45	L1	9	271
HPV45	E6	8	43	HPV45	L1	11	114
HPV45	E6	11	47	HPV45	L1	10	296
HPV45	E6	8	128	HPV45	L1	11	169
HPV45	E6	8	60	HPV45	L1	8	283
HPV45	E6	9	102	HPV45	L1	8	24
HPV45	E6	10	101	HPV45	L1	8	498
HPV45	E6	10	1	HPV45	L1	9	498
HPV45	E6	8	100	HPV45	L1	10	498
HPV45	E6	11	100	HPV45	L1	8	237
HPV45	E6	10	83	HPV45	L1	11	450
HPV45	E6	8	139	HPV45	L1	9	359
HPV45	E6	11	139	HPV45	L1	10	82
HPV45	E6	10	95	HPV45	L1	11	503
HPV45	E6	9	114	HPV45	L1	10	143
HPV45	E6	11	114	HPV45	L1	11	328
HPV45	E6	8	111	HPV45	L1	10	473
HPV45	E6	9	111	HPV45	L1	8	91
HPV45	E6	8	144	HPV45	L1	11	91
HPV45	E6	9	144	HPV45	L1	10	68
HPV45	E6	10	144	HPV45	L1	9	144
HPV45	E6	11	144	HPV45	L1	9	69
HPV45	E6	10	41	HPV45	L1	8	499
HPV45	E6	8	29	HPV45	L1	9	499
HPV45	E6	9	84	HPV45	L1	8	49
HPV45	E6	9	28	HPV45	L1	9	383
HPV45	E6	8	72	HPV45	L1	10	516
HPV45	E7	9	64	HPV45	L1	9	190
HPV45	E7	8	78	HPV45	L1	8	526
HPV45	E7	10	44	HPV45	L1	10	526
HPV45	E7	11	44	HPV45	L1	11	526
HPV45	E7	8	47	HPV45	L1	10	22
HPV45	E7	11	62	HPV45	L1	10	248
HPV45	E7	8	61	HPV45	L1	8	508
HPV45	E7	11	75	HPV45	L1	9	387
HPV45	E7	9	51	HPV45	L1	10	440
HPV45	E7	11	51	HPV45	L1	10	380
HPV45	E7	11	49	HPV45	L1	10	281
HPV45	E7	8	54	HPV45	L1	11	334
HPV45	E7	10	76	HPV45	L1	11	357
HPV45	E7	9	45	HPV45	L1	9	452
HPV45	E7	10	45	HPV45	L1	11	67
HPV45	L1	9	517	HPV45	L1	9	101
HPV45	L1	11	161	HPV45	L1	8	529
HPV45	L1	8	191	HPV45	L1	11	46
HPV45	L1	11	234	HPV45	L1	10	77
HPV45	L1	9	523	HPV45	L1	9	93
HPV45	L1	11	523	HPV45	L1	10	58
HPV45	L1	8	518	HPV45	L1	8	272

Table IX
HLA-A3 Supermotif Peptides

HPV45 L1	11	486	HPV45 L2	10	302
HPV45 L1	8	521	HPV45 L2	11	298
HPV45 L1	9	521	HPV45 L2	10	281
HPV45 L1	11	521	HPV45 L2	11	281
HPV45 L1	10	115	HPV45 L2	11	225
HPV45 L1	10	519	HPV45 L2	9	308
HPV45 L1	11	519	HPV45 L2	10	68
HPV45 L1	8	453	HPV45 L2	10	220
HPV45 L1	8	522	HPV45 L2	10	13
HPV45 L1	10	522	HPV45 L2	8	288
HPV45 L1	9	163	HPV45 L2	11	288
HPV45 L1	9	116	HPV45 L2	9	211
HPV45 L1	9	330	HPV45 L2	10	211
HPV45 L1	11	57	HPV45 L2	11	362
HPV45 L1	8	442	HPV45 L2	8	212
HPV45 L1	9	520	HPV45 L2	9	212
HPV45 L1	10	520	HPV45 L2	11	212
HPV45 L1	10	329	HPV45 L2	9	358
HPV45 L1	9	441	HPV45 L2	10	363
HPV45 L1	8	70	HPV45 L2	8	304
HPV45 L1	9	297	HPV45 L2	8	359
HPV45 L1	11	36	HPV45 L2	10	293
HPV45 L1	8	102	HPV45 L2	9	217
HPV45 L1	10	92	HPV45 L2	9	80
HPV45 L1	8	360	HPV45 L2	8	2
HPV45 L1	10	47	HPV45 L2	9	2
HPV45 L1	9	78	HPV45 L2	10	2
HPV45 L1	10	127	HPV45 L2	8	81
HPV45 L1	8	196	HPV45 L2	11	437
HPV45 L1	8	477	HPV45 L2	9	227
HPV45 L1	10	303	HPV56 E2	9	177
HPV45 L1	9	38	HPV56 E2	10	177
HPV45 L2	10	286	HPV56 E2	8	178
HPV45 L2	8	12	HPV56 E2	9	178
HPV45 L2	11	12	HPV56 E2	11	178
HPV45 L2	10	357	HPV56 E2	8	4
HPV45 L2	9	14	HPV56 E2	8	71
HPV45 L2	9	303	HPV56 E2	10	176
HPV45 L2	9	273	HPV56 E2	11	176
HPV45 L2	9	276	HPV56 E2	9	195
HPV45 L2	11	306	HPV56 E2	8	140
HPV45 L2	11	58	HPV56 E2	8	213
HPV45 L2	10	25	HPV56 E2	10	213
HPV45 L2	9	60	HPV56 E2	8	117
HPV45 L2	11	292	HPV56 E2	8	43
HPV45 L2	10	210	HPV56 E2	9	43
HPV45 L2	11	210	HPV56 E2	8	191
HPV45 L2	10	34	HPV56 E2	10	154
HPV45 L2	9	287	HPV56 E2	8	61
HPV45 L2	8	1	HPV56 E2	10	99
HPV45 L2	9	1	HPV56 E2	10	59
HPV45 L2	10	1	HPV56 E2	11	210
HPV45 L2	11	1	HPV56 E2	8	239
HPV45 L2	10	79	HPV56 E2	10	239
HPV45 L2	11	285	HPV56 E2	9	297
HPV45 L2	11	356	HPV56 E2	9	283
HPV45 L2	11	209	HPV56 E2	10	211
HPV45 L2	9	214	HPV56 E2	11	281
HPV45 L2	10	216	HPV56 E2	9	233
HPV45 L2	9	11	HPV56 E2	9	90

Table IX
HLA-A3 Supermotif Peptides

HPV56	E2	11	295	HPV56	E6	10	135
HPV56	E2	9	46	HPV56	E6	8	73
HPV56	E2	10	46	HPV56	E7	10	75
HPV56	E2	9	1	HPV56	E7	8	39
HPV56	E2	11	1	HPV56	E7	11	70
HPV56	E2	8	292	HPV56	E7	10	42
HPV56	E2	11	236	HPV56	E7	8	62
HPV56	E2	10	301	HPV56	E7	10	60
HPV56	E2	8	246	HPV56	E7	8	73
HPV56	E2	11	246	HPV56	E7	8	77
HPV56	E2	11	188	HPV56	E7	10	71
HPV56	E2	8	279	HPV56	E7	11	59
HPV56	E2	11	223	HPV56	L1	11	241
HPV56	E2	8	196	HPV56	L1	8	198
HPV56	E2	11	266	HPV56	L1	8	58
HPV56	E2	10	282	HPV56	L1	11	381
HPV56	E2	11	28	HPV56	L1	9	444
HPV56	E2	8	234	HPV56	L1	9	37
HPV56	E2	9	155	HPV56	L1	8	512
HPV56	E2	8	179	HPV56	L1	11	79
HPV56	E2	10	179	HPV56	L1	11	195
HPV56	E2	10	237	HPV56	L1	8	136
HPV56	E2	9	302	HPV56	L1	10	389
HPV56	E2	10	45	HPV56	L1	8	257
HPV56	E2	11	45	HPV56	L1	9	491
HPV56	E2	9	278	HPV56	L1	10	491
HPV56	E2	9	111	HPV56	L1	8	278
HPV56	E2	10	111	HPV56	L1	9	278
HPV56	E6	8	89	HPV56	L1	11	176
HPV56	E6	9	89	HPV56	L1	10	236
HPV56	E6	10	139	HPV56	L1	11	121
HPV56	E6	9	69	HPV56	L1	10	404
HPV56	E6	10	69	HPV56	L1	10	308
HPV56	E6	9	50	HPV56	L1	10	303
HPV56	E6	10	33	HPV56	L1	8	290
HPV56	E6	8	101	HPV56	L1	11	290
HPV56	E6	10	28	HPV56	L1	8	501
HPV56	E6	11	28	HPV56	L1	10	501
HPV56	E6	8	23	HPV56	L1	8	33
HPV56	E6	11	20	HPV56	L1	9	364
HPV56	E6	11	44	HPV56	L1	10	150
HPV56	E6	11	48	HPV56	L1	10	378
HPV56	E6	9	88	HPV56	L1	10	334
HPV56	E6	10	88	HPV56	L1	8	98
HPV56	E6	8	137	HPV56	L1	11	98
HPV56	E6	8	70	HPV56	L1	10	55
HPV56	E6	9	70	HPV56	L1	11	55
HPV56	E6	11	70	HPV56	L1	11	45
HPV56	E6	8	31	HPV56	L1	11	168
HPV56	E6	8	98	HPV56	L1	9	502
HPV56	E6	11	98	HPV56	L1	9	151
HPV56	E6	8	119	HPV56	L1	8	385
HPV56	E6	9	119	HPV56	L1	10	36
HPV56	E6	9	110	HPV56	L1	11	333
HPV56	E6	8	30	HPV56	L1	9	2
HPV56	E6	9	30	HPV56	L1	10	1
HPV56	E6	9	67	HPV56	L1	11	95
HPV56	E6	11	67	HPV56	L1	9	123
HPV56	E6	8	90	HPV56	L1	8	91
HPV56	E6	10	21	HPV56	L1	9	197

Table IX
HLA-A3 Supermotif Peptides

HPV56	L1	8	511	HPV56	L1	10	134
HPV56	L1	9	511	HPV56	L1	8	203
HPV56	L1	10	31	HPV56	L1	8	310
HPV56	L1	10	255	HPV56	L1	9	47
HPV56	L1	10	467	HPV56	L1	10	283
HPV56	L1	9	522	HPV56	L1	9	85
HPV56	L1	10	522	HPV56	L1	11	453
HPV56	L1	11	522	HPV56	L2	8	222
HPV56	L1	9	442	HPV56	L2	10	281
HPV56	L1	11	442	HPV56	L2	11	281
HPV56	L1	10	288	HPV56	L2	9	438
HPV56	L1	11	339	HPV56	L2	10	438
HPV56	L1	11	362	HPV56	L2	11	438
HPV56	L1	8	384	HPV56	L2	8	12
HPV56	L1	9	384	HPV56	L2	11	12
HPV56	L1	11	35	HPV56	L2	10	367
HPV56	L1	11	260	HPV56	L2	9	14
HPV56	L1	10	508	HPV56	L2	9	30
HPV56	L1	11	508	HPV56	L2	10	437
HPV56	L1	9	455	HPV56	L2	11	437
HPV56	L1	9	108	HPV56	L2	9	276
HPV56	L1	11	520	HPV56	L2	9	287
HPV56	L1	9	100	HPV56	L2	11	58
HPV56	L1	11	100	HPV56	L2	10	25
HPV56	L1	10	67	HPV56	L2	9	60
HPV56	L1	10	446	HPV56	L2	9	293
HPV56	L1	8	279	HPV56	L2	10	293
HPV56	L1	8	456	HPV56	L2	8	221
HPV56	L1	9	379	HPV56	L2	9	221
HPV56	L1	10	261	HPV56	L2	10	210
HPV56	L1	11	489	HPV56	L2	11	210
HPV56	L1	8	526	HPV56	L2	8	81
HPV56	L1	9	526	HPV56	L2	8	302
HPV56	L1	8	524	HPV56	L2	10	34
HPV56	L1	9	524	HPV56	L2	10	235
HPV56	L1	10	524	HPV56	L2	8	1
HPV56	L1	11	524	HPV56	L2	9	1
HPV56	L1	8	86	HPV56	L2	10	1
HPV56	L1	8	380	HPV56	L2	11	1
HPV56	L1	9	304	HPV56	L2	11	285
HPV56	L1	11	377	HPV56	L2	11	209
HPV56	L1	9	335	HPV56	L2	8	369
HPV56	L1	11	66	HPV56	L2	11	78
HPV56	L1	8	445	HPV56	L2	8	441
HPV56	L1	11	445	HPV56	L2	9	441
HPV56	L1	8	525	HPV56	L2	10	441
HPV56	L1	9	525	HPV56	L2	11	441
HPV56	L1	10	525	HPV56	L2	11	306
HPV56	L1	8	523	HPV56	L2	10	68
HPV56	L1	9	523	HPV56	L2	9	11
HPV56	L1	10	523	HPV56	L2	9	220
HPV56	L1	11	523	HPV56	L2	10	220
HPV56	L1	8	57	HPV56	L2	11	298
HPV56	L1	9	57	HPV56	L2	11	225
HPV56	L1	8	443	HPV56	L2	10	13
HPV56	L1	10	443	HPV56	L2	9	211
HPV56	L1	10	99	HPV56	L2	10	211
HPV56	L1	8	365	HPV56	L2	10	79
HPV56	L1	9	56	HPV56	L2	8	212
HPV56	L1	10	56	HPV56	L2	9	212

Table IX
HLA-A3 Supermotif Peptides

```
HPV56 L2    9    80
HPV56 L2    8    288
HPV56 L2    11   288
HPV56 L2    8    2
HPV56 L2    9    2
HPV56 L2    10   2
HPV56 L2    11   280
HPV56 L2    11   366
HPV56 L2    9    236
HPV56 L2    8    31
```

SF 1168096 v1

Table IXA HPV 6A
HLA-A3 Supermotif Peptides

2	3	4
L1	8	234
E1	8	206
L1	9	489
L1	11	489
L2	10	286
E1	9	112
E1	10	112
L1	11	420
E1	10	475
L1	11	203
L1	8	487
L1	9	487
L1	11	487
L2	11	12
E2	8	322
L2	8	288
L2	11	288
L1	8	22
E1	8	407
L2	9	14
E6	9	10
E6	9	86
E1	8	77
E1	9	77
E1	9	101
L1	10	43
L1	11	43
E2	8	231
E2	9	231
E2	11	231
L1	10	483
L1	11	483
E1	11	601
E6	10	64
L1	11	157
E1	9	406
E2	8	296
E2	11	35
L1	8	99
E1	8	640
E1	10	111
E1	11	111
E2	8	230
E2	9	230
E2	10	230
L1	8	219
E6	8	96
E1	9	570
E7	10	88
E1	10	222
E2	10	25
E1	9	203
E1	11	203
L1	11	84
E1	11	73
L1	11	269
E6	11	99
E1	10	178
E2	9	174

L2	8	274
L2	11	274
E1	10	143
E1	8	336
E1	8	180
E1	8	62
E1	10	100
E1	9	375
E1	10	105
E6	8	42
E6	11	42
L1	9	453
L1	10	453
E1	9	197
E1	8	604
E2	11	74
E1	8	417
E2	8	100
E2	9	100
E1	11	373
E2	9	293
E2	11	293
E2	9	39
E7	11	39
E6	11	113
L1	8	206
L1	8	252
L2	8	442
E1	9	220
E6	9	126
E6	11	126
E1	9	454
L1	8	463
L1	10	463
E4	11	21
E1	9	393
L1	10	245
L2	9	276
L1	8	49
E1	11	587
L1	9	326
L2	11	58
E1	9	194
E2	10	156
E1	8	350
E1	9	217
L2	11	292
E2	9	55
E1	9	273
E1	11	273
L1	11	130
E1	11	431
L2	9	303
E1	8	632
E1	10	191
L2	10	25
L2	9	60
E1	8	145
L1	8	407
E4	9	90

Table IXA HPV 6A
HLA-A3 Supermotif Peptides

E1	9	316	E1	11	540
L1	9	478	E4	10	8
L1	10	113	E4	11	8
E1	10	415	E4	8	24
E2	11	53	E1	8	198
E6	10	119	L1	9	464
E4	8	10	E1	8	276
E4	9	10	E1	11	276
E1	9	246	E1	11	563
L2	8	3	E1	8	218
L2	9	3	E1	11	218
E6	11	25	L1	9	439
L2	11	306	L1	11	439
L2	8	149	E4	8	81
E2	9	29	E6	8	121
E1	8	376	E1	9	115
E1	11	474	E1	10	115
L2	9	287	E1	11	115
L1	8	272	E1	10	277
E1	8	195	E1	8	279
E1	11	195	E1	10	279
E6	9	120	L2	10	293
E1	9	106	L1	11	295
E2	11	315	E1	10	564
L1	10	421	E7	11	67
E1	8	571	L1	9	233
E2	10	267	L2	8	1
E2	11	267	L2	9	1
L2	8	82	L2	10	1
E7	9	89	L2	11	1
E1	9	476	E1	8	546
L1	8	486	E1	8	421
L1	9	486	E1	10	421
L1	10	486	E1	8	274
E1	9	433	E1	10	274
E2	9	351	E1	10	607
E6	9	128	E1	9	568
E1	8	114	E1	11	568
E1	10	114	E1	10	451
E1	11	114	L1	10	31
E1	9	462	E4	9	23
E1	10	462	L1	10	438
E1	9	420	E1	8	397
E1	11	420	L1	9	352
E1	8	286	E1	11	59
E2	9	165	E1	10	395
E2	9	147	L2	9	38
E6	8	116	E2	10	348
E6	10	116	L2	9	237
E1	10	121	L2	11	285
E1	11	283	L1	11	482
L1	8	61	L2	8	438
L1	11	61	L2	9	438
L1	11	19	L2	10	438
L1	9	71	L2	11	438
L1	11	42	L1	10	217
L1	9	271	E6	9	110
E6	9	101	E4	8	34
E1	9	223	E4	9	34
E2	11	266	L1	8	160

Table IXA HPV 6A
HLA-A3 Supermotif Peptides

L1	10	160	L1	9	348
E2	8	61	E2	8	40
E1	9	545	E6	10	40
L2	10	80	E1	9	192
L1	9	266	E1	11	192
L2	8	212	L2	8	39
L2	10	212	L1	10	270
E4	9	38	E6	10	26
E4	10	38	E6	11	8
E4	11	38	L2	10	147
E6	8	28	E1	8	566
L1	11	301	E1	11	566
L1	11	324	E4	11	78
L1	10	232	L1	11	346
L1	10	250	E2	11	97
E2	9	76	E6	11	39
E1	8	305	E6	8	11
E1	11	314	E6	8	87
L1	11	466	E4	8	91
L1	9	417	E1	8	78
E2	9	103	E2	10	334
E2	10	103	E1	8	317
E2	11	103	L1	9	21
E2	9	233	E1	11	333
E1	9	205	E2	8	30
E1	11	391	E6	10	100
L1	9	53	E4	11	7
L2	11	298	E1	9	275
E1	9	109	E1	9	278
L1	8	241	E1	11	278
L2	10	281	L1	9	114
L2	11	281	L1	10	62
L2	9	308	L1	9	484
L1	9	472	L1	10	484
L1	10	472	L1	11	484
L1	11	476	L1	10	296
L1	9	140	L2	11	146
L1	8	488	E1	9	565
L1	10	488	E2	11	333
L2	10	13	L1	8	327
E6	10	9	E2	9	335
E1	9	422	L1	10	20
L1	8	474	E2	9	349
E1	8	247	E2	11	349
L2	9	81	L1	8	72
E1	10	60	L1	11	58
L1	9	86	E2	11	58
E4	9	80	E7	10	68
L2	8	304	L1	10	97
L1	9	297	E2	9	321
L1	11	451	E1	8	426
L1	8	473	E1	9	530
L1	9	473	E1	8	464
L1	10	85	E1	9	510
E4	10	79	E2	11	145
L2	11	209	E6	10	85
E2	10	316	E1	8	76
L1	10	347	E1	9	76
L2	10	210	E1	10	76
E2	9	317	E6	11	46

Table IXA HPV 6A
HLA-A3 Supermotif Peptides

L2	10	435
L2	11	435
E6	9	44
L1	11	350
E1	10	402
E2	10	168
L2	9	71
L1	10	10
E2	10	138
L1	11	415

Table IXB. HPV6B
HLA-A3 Supermotif Peptides

2	3	4		2	3	4
L1	8	234		E2	9	174
E1	8	206		L2	8	274
L1	9	489		L2	11	274
L1	11	489		E1	10	143
L2	10	286		E1	8	336
E1	9	112		E1	8	180
E1	10	112		R1	8	62
L1	11	420		E1	10	100
E1	10	475		E1	9	375
L1	11	203		E1	10	105
L1	8	487		E6	8	42
L1	9	487		E6	11	42
L1	11	487		L1	9	453
L2	11	12		L1	10	453
L2	8	288		E1	9	197
L2	11	288		E1	8	604
E2	8	322		E2	11	74
L1	8	22		E1	8	417
E1	8	407		E2	8	100
L2	9	14		E2	9	100
E6	9	10		E1	11	373
E6	9	86		E2	9	293
E1	8	77		E2	11	293
E1	9	77		E2	9	39
E1	9	101		E7	11	39
L1	10	43		E6	11	113
L1	11	43		L1	8	206
E5B	9	36		L1	8	252
E5B	11	36		L2	8	442
E2	8	231		E1	9	220
E2	9	231		E6	9	126
E2	11	231		E6	11	126
L1	10	483		E1	9	454
L1	11	483		L1	8	463
E1	11	601		L1	10	463
E6	10	64		E4	11	31
L1	11	157		E1	9	393
E1	9	406		L1	10	245
E2	8	296		L2	9	276
E2	11	35		L1	8	49
L1	8	99		E1	11	587
E1	8	640		L1	9	326
E1	10	111		L2	11	58
E1	11	111		E1	9	194
E2	8	230		E2	10	156
E2	9	230		E1	8	350
E2	10	230		E5B	8	28
L1	8	219		E1	9	217
E6	8	96		L2	11	292
E1	9	570		E5B	11	25
E2	10	25		E2	9	55
E1	10	222		E1	9	273
E1	9	203		E1	11	273
E1	11	203		L1	11	130
L1	11	84		E1	11	431
E1	11	73		L2	9	303
L1	11	269		E1	8	632
E6	11	99		E1	10	191
E1	10	178		L2	10	25
				L2	9	60

Table IXB. HPV6B
HLA-A3 Supermotif Peptides

E1	8	145		L1	9	271
L1	8	407		E6	9	101
E4	9	100		E1	9	223
E1	9	316		E2	11	266
L1	9	478		E1	11	540
L1	10	113		E4	10	18
E1	10	415		E4	11	18
E2	11	53		E4	8	34
E6	10	119		E1	8	198
E4	8	20		L1	9	464
E4	9	20		E1	8	279
E1	9	246		E1	10	279
L2	8	3		E1	8	276
L2	9	3		E1	11	276
E5B	9	42		E1	11	563
E6	11	25		E5B	11	31
L2	11	306		E1	8	218
L2	8	149		E1	11	218
E2	9	29		L1	9	439
E1	8	376		L1	11	439
E1	11	474		E4	8	91
L2	9	287		E6	8	121
L1	8	272		E1	9	115
E1	8	195		E1	10	115
E1	11	195		E1	11	115
E6	9	120		E1	10	277
E1	9	106		L2	10	293
E2	11	315		L1	11	295
L1	10	421		E1	10	564
E1	8	571		E7	11	67
E2	10	267		L1	9	233
E2	11	267		L2	8	1
L2	8	82		L2	9	1
E7	9	89		L2	10	1
E1	9	476		L2	11	1
L1	8	486		E5B	10	26
L1	9	486		E1	8	546
L1	10	486		E1	8	421
E1	9	433		E1	10	421
E2	9	351		E1	8	274
E6	9	128		E1	10	274
E1	8	114		E1	9	568
E1	10	114		E1	11	568
E1	11	114		E1	10	451
E1	9	462		L1	10	31
E1	10	462		E7	10	88
E1	9	420		E4	9	33
E1	11	420		L1	10	438
E1	8	286		E1	8	397
E2	9	165		L1	9	352
E2	9	147		E1	11	59
E6	8	116		E1	10	395
E6	10	116		L2	9	38
E1	10	121		E1	10	607
E1	11	283		L2	9	237
L1	8	61		L2	11	285
L1	11	61		L1	11	482
L1	11	19		L2	8	438
L1	9	71		L2	9	438
L1	11	42		L2	10	438

Table IXB. HPV6B
HLA-A3 Supermotif Peptides

L2	11	438		L1	9	473
L1	10	217		L1	10	85
E6	9	110		E4	10	89
E4	8	44		L2	11	209
E4	9	44		E2	10	316
L1	8	160		L1	10	347
L1	10	160		E2	9	220
E2	8	61		L2	10	210
E1	9	545		E2	9	317
L2	10	80		L1	9	348
L1	9	265		E2	8	40
L2	8	212		E6	10	40
L2	10	212		E1	9	192
E4	9	48		E1	11	192
E4	10	48		L2	8	39
E4	11	48		L1	10	270
E6	8	28		E6	10	26
L1	11	301		E2	8	221
L1	11	324		E6	11	8
L1	10	232		L2	10	147
L1	10	250		E1	8	566
E2	9	76		E1	11	566
E1	8	305		E4	11	88
E1	11	314		L1	11	346
L1	11	466		E2	10	219
L1	9	417		E2	11	97
E2	9	103		E6	11	39
E2	10	103		E6	8	11
E2	11	103		E6	8	87
E2	9	233		E4	8	101
E2	11	218		E1	8	78
E1	9	205		E2	10	334
E1	11	391		E1	8	317
L1	9	53		L1	9	21
E5B	10	35		E1	11	333
L2	11	298		E2	8	30
E1	9	109		E6	10	100
L1	8	241		E4	11	17
L2	10	281		E1	9	278
L2	11	281		E1	11	278
L2	9	308		E1	9	275
L1	9	472		L1	9	114
L1	10	472		L1	10	62
L1	11	476		L1	9	484
L1	9	140		L1	10	484
L1	8	488		L1	11	484
L1	10	488		L1	10	296
L2	10	13		L2	11	146
E6	10	9		E1	9	565
E1	9	422		E2	11	333
L1	8	474		L1	8	327
E1	8	247		E2	9	335
L2	9	81		L1	10	20
E1	10	60		E2	11	349
L1	9	86		L1	8	72
E4	9	90		L1	11	58
L2	8	304		E2	11	58
L1	9	297		E7	10	68
L1	11	451		L1	10	97
L1	8	473		E2	9	321

Table IXB. HPV6B
HLA-A3 Supermotif Peptides

E1	8	426
E1	9	530
E1	8	464
E1	9	510
E2	11	145
E6	10	85
E1	8	76
E1	9	76
E1	10	76
E6	11	46
L2	10	435
L2	11	435
E6	9	44
L1	11	350
E1	10	402
E2	10	168
L2	9	71
L1	10	10
E2	10	138
L1	11	415

Table IXC HPV11
HLA-A3 Supermotif Peptides

2	3	4			
L1	8	235	E1	8	336
E1	9	112	E1	8	62
E1	10	112	E1	8	180
E1	8	407	E1	9	375
L1	11	421	E6	11	113
L2	9	80	E1	10	105
L2	10	285	E6	8	42
E1	10	475	E6	11	42
L1	11	204	L1	9	454
L2	11	11	L1	10	454
E2	8	321	E1	9	197
E2	8	197	E6	10	69
L1	8	22	E1	8	604
L2	8	13	E1	8	417
E6	9	10	E2	11	74
E1	8	77	E2	8	100
E1	9	77	E2	9	100
L1	9	349	E1	11	373
E1	9	101	E2	9	39
L1	10	43	E6	8	92
L1	11	43	E1	10	141
E5	9	37	L1	8	207
E5	11	26	L1	8	253
L1	10	484	L2	8	438
L1	11	484	E6	9	126
E1	11	601	E6	11	126
E6	10	64	E1	9	454
E1	9	406	L1	8	464
E5	8	46	L1	10	464
L1	11	158	E1	9	393
E2	11	35	L2	9	275
E2	8	295	E1	11	587
E2	11	194	E1	9	220
L1	8	99	L1	9	327
E1	8	640	L2	11	57
E1	11	73	L1	9	479
E1	10	111	E1	9	194
E1	11	111	E2	10	156
E1	10	607	E5	8	29
L1	8	220	E1	9	217
E1	10	168	L2	11	291
E2	10	25	E1	9	273
E6	8	96	E1	11	273
E1	9	203	E1	8	632
E1	11	203	L2	10	24
E1	9	570	E5	9	40
E1	10	222	E5	11	40
L1	10	271	L2	9	59
L1	10	439	E1	11	431
E1	9	46	L1	8	408
E2	9	292	E4	9	99
E2	11	292	E1	9	316
E7	9	31	E2	8	232
L1	11	84	E2	9	232
E1	10	191	E2	11	232
E1	8	143	L1	10	113
E1	10	178	E1	10	415
L2	8	273	E6	10	119
L2	11	273	E2	9	29
			L1	11	325

Table IXC HPV11
HLA-A3 Supermotif Peptides

E4	9	20		L1	9	465
E1	8	305		L1	9	272
E1	9	246		E1	8	276
E1	9	349		E1	11	276
E6	11	25		E1	11	563
L2	10	36		E1	8	218
E1	8	376		E1	11	218
E1	11	474		E4	8	90
E1	8	195		E2	9	103
E1	11	195		E2	10	103
E6	9	120		E1	9	115
E2	8	30		E1	10	115
E1	8	571		E1	11	115
E1	9	106		E2	9	334
L1	10	422		L1	8	273
L2	8	81		E1	10	277
L2	9	286		L2	10	292
E7	9	89		L1	11	296
E1	9	476		E1	10	564
E2	8	265		E7	11	67
E2	11	265		L1	9	234
E2	9	350		L1	9	440
E6	8	116		L1	11	440
E6	10	116		E1	8	546
E1	11	460		E1	8	421
E6	9	128		E1	10	421
E1	8	114		L1	9	339
E1	10	114		E1	8	47
E1	11	114		E1	8	274
E1	9	462		E1	10	274
E1	10	462		E4	8	1
E1	9	420		E1	10	100
E1	11	420		E1	9	568
L1	11	347		E1	11	568
E1	10	484		E1	10	451
E1	8	286		L1	10	31
E5	8	43		E7	10	88
E5	11	43		E2	9	264
E2	9	165		E4	9	33
E1	9	433		E1	8	397
E1	10	121		L1	10	338
E6	11	99		L1	9	353
E1	11	283		E1	10	395
L1	9	53		E1	11	59
L1	8	61		E2	10	347
L1	11	61		E2	9	248
E2	9	147		L2	9	236
L1	10	19		L2	10	79
L1	11	19		L2	11	284
L1	9	71		E4	9	49
L1	11	42		E4	10	49
E6	9	101		E4	11	49
E1	8	279		E2	9	196
E1	10	279		L1	11	483
E1	9	223		E6	9	110
E1	11	540		L1	10	218
E4	11	18		L1	8	161
E4	8	34		L2	8	211
E1	8	198		L2	10	211
E4	11	31		E4	9	44

Table IXC HPV11
HLA-A3 Supermotif Peptides

E4	10	44		E2	11	348
E2	8	61		E2	8	40
E1	9	545		E6	10	40
L1	8	488		L1	9	490
L1	9	488		L1	11	490
L1	11	488		L2	8	38
L2	9	206		L1	8	340
L2	8	434		E2	8	249
L2	9	434		E6	10	26
L2	10	434		E2	10	333
L2	11	434		L1	8	474
L1	9	267		L1	9	474
E6	8	28		E6	11	8
L1	11	302		E1	9	192
E2	10	288		E1	11	192
L1	10	233		E6	8	11
L1	10	251		E1	8	566
E2	9	76		E1	11	566
E1	11	314		L2	8	287
L1	11	467		L2	11	287
L1	9	418		E4	11	87
E1	11	391		L2	8	207
E5	8	36		E2	11	97
E5	10	36		E6	11	39
L2	11	297		E2	11	228
E2	9	37		L2	9	37
E2	11	37		E1	8	116
L1	8	242		E1	9	116
E4	9	59		E1	10	116
L2	10	280		E4	8	100
L2	11	280		E1	8	78
L2	9	307		L1	8	21
E1	9	205		L1	9	21
L1	11	477		E1	11	333
L1	9	473		E5	10	27
L1	10	473		E6	10	100
L1	9	141		E1	9	278
E2	9	234		E1	11	278
L1	8	475		E1	9	275
L2	10	12		E2	8	233
E6	10	9		E2	10	233
L1	10	348		L1	9	114
E1	8	247		L1	10	62
E1	9	422		L1	9	485
E1	8	350		L1	10	485
L1	9	86		L1	11	485
E4	9	89		L1	10	297
L1	9	298		E2	10	266
E7	8	32		E2	11	266
E7	11	32		E2	11	332
L1	11	452		E1	9	565
L1	10	85		E2	8	148
E4	10	88		L1	8	328
L2	11	208		L1	9	20
L1	8	489		L1	10	20
L1	10	489		E7	10	68
E1	8	206		L1	8	72
L2	10	209		L1	11	58
E1	10	60		E2	11	58
E2	9	348		L1	10	97

Table IXC HPV11
HLA-A3 Supermotif Peptides

E2	9	320
E1	8	426
E1	8	464
E1	9	510
E2	10	102
E2	11	102
E1	9	530
E2	11	145
E1	8	76
E1	9	76
E1	10	76
E6	9	44
E6	11	46
L2	9	70
L2	10	431
L2	11	431
E2	10	138
L1	10	246
L1	8	49
L1	11	351
L2	11	305
E1	10	402
E2	10	168
L1	10	10
L1	11	416

Table X
HLA A24 Supermotif Peptides

1	2	3	4
HPV16	E1	8	240
HPV16	E1	11	391
HPV16	E1	9	539
HPV16	E1	9	459
HPV16	E1	9	318
HPV16	E1	9	206
HPV16	E1	10	206
HPV16	E1	8	524
HPV16	E1	9	524
HPV16	E1	9	82
HPV16	E1	10	82
HPV16	E1	11	23
HPV16	E1	9	500
HPV16	E1	10	500
HPV16	E1	11	500
HPV16	E1	11	237
HPV16	E1	9	259
HPV16	E1	9	304
HPV16	E1	8	353
HPV16	E1	11	353
HPV16	E1	10	101
HPV16	E1	10	640
HPV16	E1	8	299
HPV16	E1	9	299
HPV16	E1	9	528
HPV16	E1	9	50
HPV16	E1	10	50
HPV16	E1	10	97
HPV16	E1	8	368
HPV16	E1	10	368
HPV16	E1	9	43
HPV16	E1	10	43
HPV16	E1	9	384
HPV16	E1	10	384
HPV16	E1	10	548
HPV16	E1	9	235
HPV16	E1	8	438
HPV16	E1	9	438
HPV16	E1	11	438
HPV16	E1	9	452
HPV16	E1	9	374
HPV16	E1	10	603
HPV16	E1	11	603
HPV16	E1	8	356
HPV16	E1	10	356
HPV16	E1	10	213
HPV16	E1	8	63
HPV16	E1	9	63
HPV16	E1	9	152
HPV16	E1	10	288
HPV16	E1	11	288
HPV16	E1	8	138
HPV16	E1	9	331
HPV16	E1	10	331
HPV16	E1	9	338
HPV16	E1	9	612
HPV16	E1	11	612
HPV16	E1	8	51
HPV16	E1	9	51
HPV16	E1	10	392
HPV16	E1	11	463
HPV16	E1	9	493
HPV16	E1	9	445
HPV16	E1	10	445
HPV16	E1	8	456
HPV16	E1	9	456
HPV16	E1	8	453
HPV16	E1	11	453
HPV16	E1	9	586
HPV16	E1	8	501
HPV16	E1	9	501
HPV16	E1	10	501
HPV16	E1	11	508
HPV16	E1	8	466
HPV16	E1	9	466
HPV16	E1	10	466
HPV16	E1	11	466
HPV16	E1	9	325
HPV16	E1	10	242
HPV16	E1	11	519
HPV16	E1	8	487
HPV16	E1	10	272
HPV16	E1	8	571
HPV16	E1	9	571
HPV16	E1	8	12
HPV16	E1	9	12
HPV16	E1	8	450
HPV16	E1	11	450
HPV16	E1	8	179
HPV16	E1	11	216
HPV16	E1	9	263
HPV16	E1	11	263
HPV16	E1	8	184
HPV16	E1	11	184
HPV16	E1	10	411
HPV16	E1	9	369
HPV16	E1	11	369
HPV16	E1	8	401
HPV16	E1	8	52
HPV16	E1	10	210
HPV16	E1	8	492
HPV16	E1	10	492
HPV16	E1	9	400
HPV16	E1	8	296
HPV16	E1	10	296
HPV16	E1	11	296
HPV16	E1	9	311
HPV16	E1	10	311
HPV16	E1	11	311
HPV16	E1	11	323
HPV16	E1	9	252
HPV16	E1	10	252
HPV16	E1	11	252
HPV16	E1	9	199
HPV16	E1	10	199
HPV16	E1	10	89
HPV16	E1	9	126
HPV16	E1	9	485
HPV16	E1	10	485

Table X
HLA A24 Supermotif Peptides

HPV16	E1	9	297	HPV16	E1	8	343
HPV16	E1	10	297	HPV16	E1	8	84
HPV16	E1	11	297	HPV16	E1	8	362
HPV16	E1	8	254	HPV16	E1	8	257
HPV16	E1	9	254	HPV16	E1	11	257
HPV16	E1	11	254	HPV16	E1	10	125
HPV16	E1	11	293	HPV16	E1	11	582
HPV16	E1	10	490	HPV16	E1	8	615
HPV16	E1	8	457	HPV16	E1	8	432
HPV16	E1	11	457	HPV16	E1	11	432
HPV16	E1	8	191	HPV16	E1	9	575
HPV16	E1	9	243	HPV16	E1	11	280
HPV16	E1	11	48	HPV16	E1	8	447
HPV16	E1	9	554	HPV16	E1	10	447
HPV16	E1	10	554	HPV16	E1	11	447
HPV16	E1	11	554	HPV16	E1	10	611
HPV16	E1	11	544	HPV16	E1	9	455
HPV16	E1	8	91	HPV16	E1	10	455
HPV16	E1	10	583	HPV16	E1	9	349
HPV16	E1	11	475	HPV16	E1	9	218
HPV16	E1	9	214	HPV16	E1	9	246
HPV16	E1	8	260	HPV16	E1	10	246
HPV16	E1	8	319	HPV16	E1	9	250
HPV16	E1	11	319	HPV16	E1	11	250
HPV16	E1	10	444	HPV16	E1	8	266
HPV16	E1	11	444	HPV16	E1	11	266
HPV16	E1	8	207	HPV16	E1	8	484
HPV16	E1	9	207	HPV16	E1	10	484
HPV16	E1	10	520	HPV16	E1	11	484
HPV16	E1	8	305	HPV16	E1	11	489
HPV16	E1	10	360	HPV16	E1	9	546
HPV16	E1	9	273	HPV16	E1	8	421
HPV16	E1	10	567	HPV16	E1	8	314
HPV16	E1	9	105	HPV16	E1	9	314
HPV16	E1	11	105	HPV16	E1	8	231
HPV16	E1	10	535	HPV16	E1	11	231
HPV16	E1	9	136	HPV16	E1	8	270
HPV16	E1	10	136	HPV16	E1	9	270
HPV16	E1	9	480	HPV16	E1	10	354
HPV16	E1	11	480	HPV16	E1	8	587
HPV16	E1	10	608	HPV16	E1	10	185
HPV16	E1	11	530	HPV16	E1	11	185
HPV16	E1	10	593	HPV16	E1	9	289
HPV16	E1	9	512	HPV16	E1	10	289
HPV16	E1	10	512	HPV16	E1	8	253
HPV16	E1	8	561	HPV16	E1	9	253
HPV16	E1	9	190	HPV16	E1	10	253
HPV16	E1	10	553	HPV16	E1	8	525
HPV16	E1	11	553	HPV16	E1	8	585
HPV16	E1	11	302	HPV16	E1	10	585
HPV16	E1	10	600	HPV16	E1	11	498
HPV16	E1	10	577	HPV16	E1	11	85
HPV16	E1	8	441	HPV16	E1	11	197
HPV16	E1	8	556	HPV16	E1	11	345
HPV16	E1	9	556	HPV16	E1	11	443
HPV16	E1	8	419	HPV16	E1	10	24
HPV16	E1	10	419	HPV16	E1	9	584
HPV16	E1	11	359	HPV16	E1	11	584
HPV16	E1	8	188	HPV16	E1	8	274
HPV16	E1	11	188	HPV16	E1	9	601

Table X
HLA A24 Supermotif Peptides

HPV16 E1	8	332		HPV16 E2	10	356
HPV16 E1	9	332		HPV16 E2	11	288
HPV16 E1	8	339		HPV16 E2	10	332
HPV16 E1	10	509		HPV16 E2	11	82
HPV16 E1	9	321		HPV16 E2	8	42
HPV16 E1	10	531		HPV16 E2	10	42
HPV16 E1	11	261		HPV16 E2	9	354
HPV16 E1	9	578		HPV16 E2	10	354
HPV16 E1	11	578		HPV16 E2	9	91
HPV16 E1	9	90		HPV16 E2	8	177
HPV16 E1	10	320		HPV16 E2	8	103
HPV16 E2	10	270		HPV16 E2	11	16
HPV16 E2	8	72		HPV16 E2	11	77
HPV16 E2	11	72		HPV16 E2	9	311
HPV16 E2	11	331		HPV16 E2	11	311
HPV16 E2	9	41		HPV16 E2	8	157
HPV16 E2	11	41		HPV16 E2	11	157
HPV16 E2	11	228		HPV16 E2	8	296
HPV16 E2	9	69		HPV16 E2	10	296
HPV16 E2	11	69		HPV16 E2	8	127
HPV16 E2	9	221		HPV16 E2	11	127
HPV16 E2	8	63		HPV16 E2	8	284
HPV16 E2	11	63		HPV16 E2	8	9
HPV16 E2	8	314		HPV16 E2	11	9
HPV16 E2	11	309		HPV16 E2	8	325
HPV16 E2	8	124		HPV16 E2	11	325
HPV16 E2	11	124		HPV16 E2	10	106
HPV16 E2	8	25		HPV16 E2	11	60
HPV16 E2	9	25		HPV16 E2	10	120
HPV16 E2	11	246		HPV16 E2	9	170
HPV16 E2	8	96		HPV16 E2	8	345
HPV16 E2	8	31		HPV16 E2	8	76
HPV16 E2	9	74		HPV16 E2	8	151
HPV16 E2	10	74		HPV16 E2	9	151
HPV16 E2	8	80		HPV16 E2	10	191
HPV16 E2	9	185		HPV16 E2	8	349
HPV16 E2	10	185		HPV16 E2	9	86
HPV16 E2	8	118		HPV16 E2	8	304
HPV16 E2	8	204		HPV16 E2	9	304
HPV16 E2	11	100		HPV16 E2	11	278
HPV16 E2	8	340		HPV16 E2	8	37
HPV16 E2	11	346		HPV16 E2	9	7
HPV16 E2	11	168		HPV16 E2	10	7
HPV16 E2	9	163		HPV16 E2	10	302
HPV16 E2	9	156		HPV16 E2	11	302
HPV16 E2	9	230		HPV16 E2	8	23
HPV16 E2	8	114		HPV16 E2	10	23
HPV16 E2	8	29		HPV16 E2	11	23
HPV16 E2	10	29		HPV16 E2	8	261
HPV16 E2	10	53		HPV16 E2	11	261
HPV16 E2	9	290		HPV16 E2	11	144
HPV16 E2	8	35		HPV16 E2	8	355
HPV16 E2	9	35		HPV16 E2	9	355
HPV16 E2	10	35		HPV16 E2	11	355
HPV16 E2	9	18		HPV16 E2	10	61
HPV16 E2	8	130		HPV16 E2	10	78
HPV16 E2	9	130		HPV16 E2	9	297
HPV16 E2	10	130		HPV16 E2	10	93
HPV16 E2	8	193		HPV16 E2	11	93
HPV16 E2	8	356		HPV16 E2	8	334

Table X
HLA A24 Supermotif Peptides

HPV16 E2	10	310		HPV16 E5	8	66
HPV16 E2	10	128		HPV16 E5	9	66
HPV16 E2	11	128		HPV16 E5	8	75
HPV16 E2	10	116		HPV16 E5	8	65
HPV16 E2	9	357		HPV16 E5	9	65
HPV16 E2	9	146		HPV16 E5	10	65
HPV16 E2	10	146		HPV16 E5	8	64
HPV16 E2	11	336		HPV16 E5	9	64
HPV16 E2	9	192		HPV16 E5	10	64
HPV16 E2	9	333		HPV16 E5	11	64
HPV16 E2	10	145		HPV16 E5	8	43
HPV16 E2	11	145		HPV16 E5	9	43
HPV16 E2	8	147		HPV16 E5	8	44
HPV16 E2	9	147		HPV16 E5	10	51
HPV16 E2	11	147		HPV16 E5	11	51
HPV16 E2	11	183		HPV16 E5	8	61
HPV16 E2	10	101		HPV16 E5	9	61
HPV16 E2	8	92		HPV16 E5	11	61
HPV16 E2	11	92		HPV16 E5	10	71
HPV16 E2	9	102		HPV16 E5	11	71
HPV16 E2	8	312		HPV16 E5	8	73
HPV16 E2	10	312		HPV16 E5	9	73
HPV16 E2	8	131		HPV16 E5	10	73
HPV16 E2	9	131		HPV16 E5	8	42
HPV16 E2	11	115		HPV16 E5	9	42
HPV16 E2	9	159		HPV16 E5	10	42
HPV16 E2	10	159		HPV16 E5	9	11
HPV16 E2	11	32		HPV16 E5	8	16
HPV16 E2	11	154		HPV16 E5	8	22
HPV16 E2	9	43		HPV16 E5	11	22
HPV16 E2	10	158		HPV16 E5	8	27
HPV16 E2	11	158		HPV16 E5	8	32
HPV16 E5	8	56		HPV16 E5	11	32
HPV16 E5	9	56		HPV16 E5	11	47
HPV16 E5	10	56		HPV16 E5	10	33
HPV16 E5	11	56		HPV16 E5	11	33
HPV16 E5	10	18		HPV16 E5	10	48
HPV16 E5	11	18		HPV16 E5	9	49
HPV16 E5	8	59		HPV16 E5	11	1
HPV16 E5	10	59		HPV16 E5	9	3
HPV16 E5	11	59		HPV16 E5	10	3
HPV16 E5	9	14		HPV16 E5	11	70
HPV16 E5	10	14		HPV16 E5	9	31
HPV16 E5	8	26		HPV16 E5	8	41
HPV16 E5	9	26		HPV16 E5	9	41
HPV16 E5	9	24		HPV16 E5	10	41
HPV16 E5	10	24		HPV16 E5	11	41
HPV16 E5	11	24		HPV16 E5	8	8
HPV16 E5	8	20		HPV16 E5	9	8
HPV16 E5	9	20		HPV16 E5	10	8
HPV16 E5	10	20		HPV16 E5	8	37
HPV16 E5	8	5		HPV16 E5	9	37
HPV16 E5	11	5		HPV16 E5	11	37
HPV16 E5	9	60		HPV16 E5	8	35
HPV16 E5	10	60		HPV16 E5	9	35
HPV16 E5	9	72		HPV16 E5	10	35
HPV16 E5	10	72		HPV16 E5	11	35
HPV16 E5	11	72		HPV16 E5	8	10
HPV16 E5	8	15		HPV16 E5	10	10
HPV16 E5	9	15		HPV16 E5	8	9

Table X
HLA A24 Supermotif Peptides

HPV16 E5	9	9		HPV16 E6	11	66
HPV16 E5	11	9		HPV16 E6	10	21
HPV16 E5	8	38		HPV16 E6	8	43
HPV16 E5	10	38		HPV16 E6	10	43
HPV16 E5	11	38		HPV16 E6	8	27
HPV16 E5	8	21		HPV16 E6	9	27
HPV16 E5	9	21		HPV16 E6	9	98
HPV16 E5	8	62		HPV16 E6	10	98
HPV16 E5	10	62		HPV16 E6	11	98
HPV16 E5	11	62		HPV16 E6	9	131
HPV16 E5	8	67		HPV16 E6	8	151
HPV16 E5	8	50		HPV16 E6	11	89
HPV16 E5	11	50		HPV16 E6	11	29
HPV16 E5	9	63		HPV16 E6	10	94
HPV16 E5	10	63		HPV16 E6	8	28
HPV16 E5	11	63		HPV16 E6	11	93
HPV16 E5	9	39		HPV16 E6	8	38
HPV16 E5	10	39		HPV16 E6	9	49
HPV16 E5	11	39		HPV16 E6	11	49
HPV16 E6	9	53		HPV16 E6	8	60
HPV16 E6	9	68		HPV16 E7	9	68
HPV16 E6	10	68		HPV16 E7	8	75
HPV16 E6	8	110		HPV16 E7	9	75
HPV16 E6	10	58		HPV16 E7	10	75
HPV16 E6	11	73		HPV16 E7	9	81
HPV16 E6	8	73		HPV16 E7	9	14
HPV16 E6	11	23		HPV16 E7	10	14
HPV16 E6	8	23		HPV16 E7	8	21
HPV16 E6	8	37		HPV16 E7	8	4
HPV16 E6	9	37		HPV16 E7	9	4
HPV16 E6	9	87		HPV16 E7	10	4
HPV16 E6	9	51		HPV16 E7	8	18
HPV16 E6	11	51		HPV16 E7	11	18
HPV16 E6	8	32		HPV16 E7	9	85
HPV16 E6	9	25		HPV16 E7	10	73
HPV16 E6	10	25		HPV16 E7	11	73
HPV16 E6	11	25		HPV16 E7	8	82
HPV16 E6	10	48		HPV16 E7	11	83
HPV16 E6	9	82		HPV16 E7	11	12
HPV16 E6	10	82		HPV16 E7	8	6
HPV16 E6	8	76		HPV16 E7	10	6
HPV16 E6	11	76		HPV16 E7	11	66
HPV16 E6	8	92		HPV16 E7	8	77
HPV16 E6	8	125		HPV16 E7	11	77
HPV16 E6	11	125		HPV16 E7	9	71
HPV16 E6	11	85		HPV16 E7	10	56
HPV16 E6	11	34		HPV16 E7	10	78
HPV16 E6	9	59		HPV16 E7	8	86
HPV16 E6	9	75		HPV16 E7	9	7
HPV16 E6	8	79		HPV16 E7	10	19
HPV16 E6	10	79		HPV16 E7	11	55
HPV16 E6	9	18		HPV16 L1	9	373
HPV16 E6	11	107		HPV16 L1	10	292
HPV16 E6	9	44		HPV16 L1	11	292
HPV16 E6	11	44		HPV16 L1	9	70
HPV16 E6	10	90		HPV16 L1	10	205
HPV16 E6	11	134		HPV16 L1	11	172
HPV16 E6	10	102		HPV16 L1	9	183
HPV16 E6	11	116		HPV16 L1	10	251
HPV16 E6	9	66		HPV16 L1	11	251

Table X
HLA A24 Supermotif Peptides

HPV16 L1	9	13		HPV16 L1	10	22
HPV16 L1	11	13		HPV16 L1	8	102
HPV16 L1	9	249		HPV16 L1	10	102
HPV16 L1	11	484		HPV16 L1	11	457
HPV16 L1	8	397		HPV16 L1	8	23
HPV16 L1	11	397		HPV16 L1	9	23
HPV16 L1	10	225		HPV16 L1	8	332
HPV16 L1	8	154		HPV16 L1	9	401
HPV16 L1	9	228		HPV16 L1	9	424
HPV16 L1	8	361		HPV16 L1	9	86
HPV16 L1	10	361		HPV16 L1	11	86
HPV16 L1	11	442		HPV16 L1	11	11
HPV16 L1	9	412		HPV16 L1	8	407
HPV16 L1	8	17		HPV16 L1	10	407
HPV16 L1	9	17		HPV16 L1	11	407
HPV16 L1	11	17		HPV16 L1	9	6
HPV16 L1	10	259		HPV16 L1	10	59
HPV16 L1	9	176		HPV16 L1	11	59
HPV16 L1	10	176		HPV16 L1	9	108
HPV16 L1	9	378		HPV16 L1	10	108
HPV16 L1	8	132		HPV16 L1	8	493
HPV16 L1	8	474		HPV16 L1	9	480
HPV16 L1	10	245		HPV16 L1	11	480
HPV16 L1	8	395		HPV16 L1	10	85
HPV16 L1	10	395		HPV16 L1	9	406
HPV16 L1	9	388		HPV16 L1	11	406
HPV16 L1	11	388		HPV16 L1	11	151
HPV16 L1	8	52		HPV16 L1	11	262
HPV16 L1	9	52		HPV16 L1	10	90
HPV16 L1	10	52		HPV16 L1	8	46
HPV16 L1	8	24		HPV16 L1	8	256
HPV16 L1	9	273		HPV16 L1	9	469
HPV16 L1	10	273		HPV16 L1	10	272
HPV16 L1	8	400		HPV16 L1	11	272
HPV16 L1	10	400		HPV16 L1	8	184
HPV16 L1	10	5		HPV16 L1	11	216
HPV16 L1	10	472		HPV16 L1	8	68
HPV16 L1	8	274		HPV16 L1	9	68
HPV16 L1	9	274		HPV16 L1	11	68
HPV16 L1	9	116		HPV16 L1	8	409
HPV16 L1	11	116		HPV16 L1	9	409
HPV16 L1	10	230		HPV16 L1	8	87
HPV16 L1	8	110		HPV16 L1	10	87
HPV16 L1	8	348		HPV16 L1	10	29
HPV16 L1	9	348		HPV16 L1	11	29
HPV16 L1	8	142		HPV16 L1	11	414
HPV16 L1	11	142		HPV16 L1	9	226
HPV16 L1	8	499		HPV16 L1	11	226
HPV16 L1	10	499		HPV16 L1	10	263
HPV16 L1	10	431		HPV16 L1	11	263
HPV16 L1	9	93		HPV16 L1	8	325
HPV16 L1	11	93		HPV16 L1	9	325
HPV16 L1	9	438		HPV16 L1	11	58
HPV16 L1	8	166		HPV16 L1	8	311
HPV16 L1	10	166		HPV16 L1	10	476
HPV16 L1	10	130		HPV16 L1	8	367
HPV16 L1	9	140		HPV16 L1	8	383
HPV16 L1	10	140		HPV16 L1	9	218
HPV16 L1	8	22		HPV16 L1	8	296
HPV16 L1	9	22		HPV16 L1	9	19

Table X
HLA A24 Supermotif Peptides

HPV16	L1	11	19	HPV16	L1	11	379
HPV16	L1	10	316	HPV16	L1	8	219
HPV16	L1	10	77	HPV16	L1	11	358
HPV16	L1	11	77	HPV16	L1	10	415
HPV16	L1	8	247	HPV16	L1	11	415
HPV16	L1	11	247	HPV16	L1	10	380
HPV16	L1	9	213	HPV16	L1	11	380
HPV16	L1	8	489	HPV16	L1	10	443
HPV16	L1	11	138	HPV16	L1	8	413
HPV16	L1	8	466	HPV16	L1	9	3
HPV16	L1	11	43	HPV16	L1	8	326
HPV16	L1	8	267	HPV16	L1	10	359
HPV16	L1	9	267	HPV16	L1	8	20
HPV16	L1	10	267	HPV16	L1	10	20
HPV16	L1	9	399	HPV16	L1	11	20
HPV16	L1	11	399	HPV16	L1	9	30
HPV16	L1	8	487	HPV16	L1	10	30
HPV16	L1	9	487	HPV16	L1	9	317
HPV16	L1	10	487	HPV16	L1	9	416
HPV16	L1	8	331	HPV16	L1	10	416
HPV16	L1	9	331	HPV16	L1	11	302
HPV16	L1	11	181	HPV16	L1	9	260
HPV16	L1	8	280	HPV16	L1	8	7
HPV16	L1	8	2	HPV16	L1	8	389
HPV16	L1	10	2	HPV16	L1	10	389
HPV16	L1	9	95	HPV16	L1	8	275
HPV16	L1	8	445	HPV16	L1	8	470
HPV16	L1	10	100	HPV16	L1	8	53
HPV16	L1	9	67	HPV16	L1	9	53
HPV16	L1	10	67	HPV16	L1	9	60
HPV16	L1	10	115	HPV16	L1	10	60
HPV16	L1	8	253	HPV16	L2	9	241
HPV16	L1	9	253	HPV16	L2	10	241
HPV16	L1	11	253	HPV16	L2	10	356
HPV16	L1	11	271	HPV16	L2	11	356
HPV16	L1	11	28	HPV16	L2	9	293
HPV16	L1	9	174	HPV16	L2	11	293
HPV16	L1	11	174	HPV16	L2	11	256
HPV16	L1	10	419	HPV16	L2	8	282
HPV16	L1	9	324	HPV16	L2	11	329
HPV16	L1	10	324	HPV16	L2	8	445
HPV16	L1	10	308	HPV16	L2	9	445
HPV16	L1	11	308	HPV16	L2	10	445
HPV16	L1	11	49	HPV16	L2	11	445
HPV16	L1	9	422	HPV16	L2	11	31
HPV16	L1	11	422	HPV16	L2	10	285
HPV16	L1	10	365	HPV16	L2	8	367
HPV16	L1	11	521	HPV16	L2	10	84
HPV16	L1	8	4	HPV16	L2	9	140
HPV16	L1	11	4	HPV16	L2	8	261
HPV16	L1	11	471	HPV16	L2	8	195
HPV16	L1	8	423	HPV16	L2	10	340
HPV16	L1	10	423	HPV16	L2	8	176
HPV16	L1	8	439	HPV16	L2	8	242
HPV16	L1	11	238	HPV16	L2	9	242
HPV16	L1	9	408	HPV16	L2	11	242
HPV16	L1	10	408	HPV16	L2	8	181
HPV16	L1	10	522	HPV16	L2	8	446
HPV16	L1	9	362	HPV16	L2	9	446
HPV16	L1	8	379	HPV16	L2	10	446

Table X
HLA A24 Supermotif Peptides

HPV16	L2	8	259	HPV16	L2	10	397
HPV16	L2	9	259	HPV16	L2	9	208
HPV16	L2	10	259	HPV16	L2	10	192
HPV16	L2	10	364	HPV16	L2	11	192
HPV16	L2	11	364	HPV16	L2	8	401
HPV16	L2	8	26	HPV16	L2	10	401
HPV16	L2	8	65	HPV16	L2	11	417
HPV16	L2	9	65	HPV16	L2	11	215
HPV16	L2	11	65	HPV16	L2	9	429
HPV16	L2	11	76	HPV16	L2	11	429
HPV16	L2	9	52	HPV16	L2	8	409
HPV16	L2	9	392	HPV16	L2	10	409
HPV16	L2	11	392	HPV16	L2	9	161
HPV16	L2	9	180	HPV16	L2	10	172
HPV16	L2	9	325	HPV16	L2	8	358
HPV16	L2	8	439	HPV16	L2	9	358
HPV16	L2	9	439	HPV16	L2	11	358
HPV16	L2	10	439	HPV16	L2	8	221
HPV16	L2	10	32	HPV16	L2	9	97
HPV16	L2	10	45	HPV16	L2	10	381
HPV16	L2	11	45	HPV16	L2	9	463
HPV16	L2	8	420	HPV16	L2	8	44
HPV16	L2	9	420	HPV16	L2	11	44
HPV16	L2	11	420	HPV16	L2	8	342
HPV16	L2	8	243	HPV16	L2	11	310
HPV16	L2	10	243	HPV16	L2	9	234
HPV16	L2	11	135	HPV16	L2	10	234
HPV16	L2	8	250	HPV16	L2	8	47
HPV16	L2	11	250	HPV16	L2	9	47
HPV16	L2	9	286	HPV16	L2	11	436
HPV16	L2	8	430	HPV16	L2	8	305
HPV16	L2	10	430	HPV16	L2	11	461
HPV16	L2	11	430	HPV16	L2	9	298
HPV16	L2	10	105	HPV16	L2	10	9
HPV16	L2	11	105	HPV16	L2	11	9
HPV16	L2	10	248	HPV16	L2	8	313
HPV16	L2	8	39	HPV16	L2	11	302
HPV16	L2	10	39	HPV16	L2	8	319
HPV16	L2	11	35	HPV16	L2	9	319
HPV16	L2	8	323	HPV16	L2	10	319
HPV16	L2	11	323	HPV16	L2	10	274
HPV16	L2	8	236	HPV16	L2	11	274
HPV16	L2	11	427	HPV16	L2	9	360
HPV16	L2	9	249	HPV16	L2	10	360
HPV16	L2	8	294	HPV16	L2	9	125
HPV16	L2	10	294	HPV16	L2	11	125
HPV16	L2	8	108	HPV16	L2	11	104
HPV16	L2	9	410	HPV16	L2	8	107
HPV16	L2	11	410	HPV16	L2	9	107
HPV16	L2	9	365	HPV16	L2	9	50
HPV16	L2	10	365	HPV16	L2	11	50
HPV16	L2	10	266	HPV16	L2	8	138
HPV16	L2	9	454	HPV16	L2	9	138
HPV16	L2	11	454	HPV16	L2	11	138
HPV16	L2	8	276	HPV16	L2	8	189
HPV16	L2	9	276	HPV16	L2	10	189
HPV16	L2	11	276	HPV16	L2	9	331
HPV16	L2	10	407	HPV16	L2	11	331
HPV16	L2	9	419	HPV16	L2	8	186
HPV16	L2	10	419	HPV16	L2	11	186

Table X
HLA A24 Supermotif Peptides

HPV16	L2	8	387	HPV18	E1	9	273
HPV16	L2	11	347	HPV18	E1	10	273
HPV16	L2	10	384	HPV18	E1	11	273
HPV16	L2	11	384	HPV18	E1	9	311
HPV16	L2	8	162	HPV18	E1	8	240
HPV16	L2	9	40	HPV18	E1	9	240
HPV16	L2	8	332	HPV18	E1	9	196
HPV16	L2	10	332	HPV18	E1	10	196
HPV16	L2	9	438	HPV18	E1	8	535
HPV16	L2	10	438	HPV18	E1	9	535
HPV16	L2	11	438	HPV18	E1	9	49
HPV16	L2	8	399	HPV18	E1	8	363
HPV16	L2	10	399	HPV18	E1	10	363
HPV16	L2	10	187	HPV18	E1	8	381
HPV16	L2	9	85	HPV18	E1	9	381
HPV16	L2	10	311	HPV18	E1	10	637
HPV16	L2	11	265	HPV18	E1	8	106
HPV16	L2	8	156	HPV18	E1	11	106
HPV16	L2	9	398	HPV18	E1	9	42
HPV16	L2	11	398	HPV18	E1	10	42
HPV16	L2	8	141	HPV18	E1	9	342
HPV16	L2	9	244	HPV18	E1	11	342
HPV16	L2	11	351	HPV18	E1	10	220
HPV16	L2	10	136	HPV18	E1	8	540
HPV16	L2	11	136	HPV18	E1	8	445
HPV16	L2	8	350	HPV18	E1	9	445
HPV16	L2	11	153	HPV18	E1	11	445
HPV16	L2	8	209	HPV18	E1	9	459
HPV16	L2	10	154	HPV18	E1	8	594
HPV16	L2	10	251	HPV18	E1	10	610
HPV16	L2	10	348	HPV18	E1	11	610
HPV16	L2	8	53	HPV18	E1	8	62
HPV16	L2	9	155	HPV18	E1	9	62
HPV16	L2	8	464	HPV18	E1	9	108
HPV16	L2	9	267	HPV18	E1	11	108
HPV16	L2	11	267	HPV18	E1	8	375
HPV16	L2	8	393	HPV18	E1	10	375
HPV16	L2	10	393	HPV18	E1	11	366
HPV16	L2	8	447	HPV18	E1	11	309
HPV16	L2	9	447	HPV18	E1	10	104
HPV16	L2	10	453	HPV18	E1	9	74
HPV16	L2	10	437	HPV18	E1	9	338
HPV16	L2	11	437	HPV18	E1	10	338
HPV16	L2	9	349	HPV18	E1	8	345
HPV16	L2	11	452	HPV18	E1	9	345
HPV16	L2	8	326	HPV18	E1	9	619
HPV18	E1	11	398	HPV18	E1	11	619
HPV18	E1	9	246	HPV18	E1	8	50
HPV18	E1	11	22	HPV18	E1	10	497
HPV18	E1	9	546	HPV18	E1	10	265
HPV18	E1	9	325	HPV18	E1	9	500
HPV18	E1	10	213	HPV18	E1	8	460
HPV18	E1	11	526	HPV18	E1	11	460
HPV18	E1	8	40	HPV18	E1	8	463
HPV18	E1	11	40	HPV18	E1	9	463
HPV18	E1	8	531	HPV18	E1	11	470
HPV18	E1	9	531	HPV18	E1	10	399
HPV18	E1	9	216	HPV18	E1	11	399
HPV18	E1	11	216	HPV18	E1	9	452
HPV18	E1	10	618	HPV18	E1	10	452

Table X
HLA A24 Supermotif Peptides

HPV18 E1	8	226		HPV18 E1	11	304
HPV18 E1	8	130		HPV18 E1	11	204
HPV18 E1	8	508		HPV18 E1	11	285
HPV18 E1	9	508		HPV18 E1	9	376
HPV18 E1	10	508		HPV18 E1	11	376
HPV18 E1	9	257		HPV18 E1	8	520
HPV18 E1	10	257		HPV18 E1	9	520
HPV18 E1	11	257		HPV18 E1	8	350
HPV18 E1	9	356		HPV18 E1	10	295
HPV18 E1	9	332		HPV18 E1	11	295
HPV18 E1	11	223		HPV18 E1	8	267
HPV18 E1	8	494		HPV18 E1	8	326
HPV18 E1	9	55		HPV18 E1	11	326
HPV18 E1	8	11		HPV18 E1	9	214
HPV18 E1	9	11		HPV18 E1	11	214
HPV18 E1	8	473		HPV18 E1	10	527
HPV18 E1	10	473		HPV18 E1	8	312
HPV18 E1	8	182		HPV18 E1	11	47
HPV18 E1	8	279		HPV18 E1	10	367
HPV18 E1	10	279		HPV18 E1	10	361
HPV18 E1	10	249		HPV18 E1	11	188
HPV18 E1	8	16		HPV18 E1	10	574
HPV18 E1	8	499		HPV18 E1	8	428
HPV18 E1	10	499		HPV18 E1	9	487
HPV18 E1	9	270		HPV18 E1	11	487
HPV18 E1	8	306		HPV18 E1	11	158
HPV18 E1	9	306		HPV18 E1	8	191
HPV18 E1	10	418		HPV18 E1	11	191
HPV18 E1	8	247		HPV18 E1	10	615
HPV18 E1	11	352		HPV18 E1	10	600
HPV18 E1	9	266		HPV18 E1	8	264
HPV18 E1	10	461		HPV18 E1	11	264
HPV18 E1	11	461		HPV18 E1	8	568
HPV18 E1	10	590		HPV18 E1	11	551
HPV18 E1	10	23		HPV18 E1	8	448
HPV18 E1	10	449		HPV18 E1	11	448
HPV18 E1	8	439		HPV18 E1	10	560
HPV18 E1	11	439		HPV18 E1	11	560
HPV18 E1	11	647		HPV18 E1	9	519
HPV18 E1	9	318		HPV18 E1	10	519
HPV18 E1	10	318		HPV18 E1	10	252
HPV18 E1	11	318		HPV18 E1	11	252
HPV18 E1	8	259		HPV18 E1	10	607
HPV18 E1	9	259		HPV18 E1	10	584
HPV18 E1	10	259		HPV18 E1	8	451
HPV18 E1	11	237		HPV18 E1	10	451
HPV18 E1	9	206		HPV18 E1	11	451
HPV18 E1	10	206		HPV18 E1	8	457
HPV18 E1	9	277		HPV18 E1	11	457
HPV18 E1	10	277		HPV18 E1	8	563
HPV18 E1	9	407		HPV18 E1	9	563
HPV18 E1	9	129		HPV18 E1	8	426
HPV18 E1	8	281		HPV18 E1	10	426
HPV18 E1	9	561		HPV18 E1	10	80
HPV18 E1	10	561		HPV18 E1	8	369
HPV18 E1	11	561		HPV18 E1	10	431
HPV18 E1	8	261		HPV18 E1	11	589
HPV18 E1	11	261		HPV18 E1	8	102
HPV18 E1	9	304		HPV18 E1	10	128
HPV18 E1	10	304		HPV18 E1	9	349

Table X

HLA A24 Supermotif Peptides

HPV18	E1	8	294		HPV18	E1	8	536
HPV18	E1	11	294		HPV18	E1	9	328
HPV18	E1	11	330		HPV18	E1	10	538
HPV18	E1	8	622		HPV18	E1	9	492
HPV18	E1	9	582		HPV18	E1	10	492
HPV18	E1	9	287		HPV18	E1	9	585
HPV18	E1	8	454		HPV18	E1	11	585
HPV18	E1	10	454		HPV18	E1	8	408
HPV18	E1	11	454		HPV18	E1	11	542
HPV18	E1	11	496		HPV18	E1	10	327
HPV18	E1	9	225		HPV18	E2	8	76
HPV18	E1	9	507		HPV18	E2	11	76
HPV18	E1	10	507		HPV18	E2	11	45
HPV18	E1	11	507		HPV18	E2	8	351
HPV18	E1	9	553		HPV18	E2	9	351
HPV18	E1	10	553		HPV18	E2	10	82
HPV18	E1	11	93		HPV18	E2	9	154
HPV18	E1	11	302		HPV18	E2	10	154
HPV18	E1	10	511		HPV18	E2	11	154
HPV18	E1	8	322		HPV18	E2	8	214
HPV18	E1	11	179		HPV18	E2	9	246
HPV18	E1	8	491		HPV18	E2	8	137
HPV18	E1	10	491		HPV18	E2	11	132
HPV18	E1	11	491		HPV18	E2	10	14
HPV18	E1	8	56		HPV18	E2	8	156
HPV18	E1	9	462		HPV18	E2	9	156
HPV18	E1	10	462		HPV18	E2	8	29
HPV18	E1	9	253		HPV18	E2	9	29
HPV18	E1	10	253		HPV18	E2	11	29
HPV18	E1	8	197		HPV18	E2	8	315
HPV18	E1	9	197		HPV18	E2	8	210
HPV18	E1	8	260		HPV18	E2	11	95
HPV18	E1	9	260		HPV18	E2	9	175
HPV18	E1	10	303		HPV18	E2	9	78
HPV18	E1	11	303		HPV18	E2	11	104
HPV18	E1	10	238		HPV18	E2	8	340
HPV18	E1	11	238		HPV18	E2	9	190
HPV18	E1	10	533		HPV18	E2	9	47
HPV18	E1	11	533		HPV18	E2	9	161
HPV18	E1	8	532		HPV18	E2	9	168
HPV18	E1	11	532		HPV18	E2	9	291
HPV18	E1	9	296		HPV18	E2	9	22
HPV18	E1	10	296		HPV18	E2	9	312
HPV18	E1	9	591		HPV18	E2	11	312
HPV18	E1	11	591		HPV18	E2	10	46
HPV18	E1	11	537		HPV18	E2	11	289
HPV18	E1	9	221		HPV18	E2	8	358
HPV18	E1	8	592		HPV18	E2	8	345
HPV18	E1	10	592		HPV18	E2	10	280
HPV18	E1	8	217		HPV18	E2	11	280
HPV18	E1	10	217		HPV18	E2	11	152
HPV18	E1	11	505		HPV18	E2	9	329
HPV18	E1	9	81		HPV18	E2	8	182
HPV18	E1	9	280		HPV18	E2	8	39
HPV18	E1	8	339		HPV18	E2	9	39
HPV18	E1	9	339		HPV18	E2	10	39
HPV18	E1	11	244		HPV18	E2	10	105
HPV18	E1	9	608		HPV18	E2	8	162
HPV18	E1	8	346		HPV18	E2	11	162
HPV18	E1	9	432		HPV18	E2	10	133

Table X
HLA A24 Supermotif Peptides

HPV18 E2	11	133	HPV18 E2	11	36
HPV18 E2	11	67	HPV18 E2	9	142
HPV18 E2	8	107	HPV18 E2	10	163
HPV18 E2	9	185	HPV18 E2	11	163
HPV18 E2	8	285	HPV18 E5	9	49
HPV18 E2	11	348	HPV18 E5	10	49
HPV18 E2	9	196	HPV18 E5	11	49
HPV18 E2	10	272	HPV18 E5	9	47
HPV18 E2	9	357	HPV18 E5	11	47
HPV18 E2	8	33	HPV18 E5	8	32
HPV18 E2	10	33	HPV18 E5	9	32
HPV18 E2	9	38	HPV18 E5	8	30
HPV18 E2	10	38	HPV18 E5	10	30
HPV18 E2	11	38	HPV18 E5	11	30
HPV18 E2	9	220	HPV18 E5	8	56
HPV18 E2	11	56	HPV18 E5	9	56
HPV18 E2	11	2	HPV18 E5	11	56
HPV18 E2	8	61	HPV18 E5	9	27
HPV18 E2	8	35	HPV18 E5	11	27
HPV18 E2	9	305	HPV18 E5	10	13
HPV18 E2	9	11	HPV18 E5	11	13
HPV18 E2	10	11	HPV18 E5	9	6
HPV18 E2	10	343	HPV18 E5	10	6
HPV18 E2	8	41	HPV18 E5	8	57
HPV18 E2	9	90	HPV18 E5	10	57
HPV18 E2	11	303	HPV18 E5	8	50
HPV18 E2	9	298	HPV18 E5	9	50
HPV18 E2	11	230	HPV18 E5	10	50
HPV18 E2	8	233	HPV18 E5	8	65
HPV18 E2	8	355	HPV18 E5	10	19
HPV18 E2	9	355	HPV18 E5	10	5
HPV18 E2	11	355	HPV18 E5	11	5
HPV18 E2	11	140	HPV18 E5	8	43
HPV18 E2	10	57	HPV18 E5	11	43
HPV18 E2	9	97	HPV18 E5	11	40
HPV18 E2	10	97	HPV18 E5	8	7
HPV18 E2	11	349	HPV18 E5	9	7
HPV18 E2	10	349	HPV18 E5	11	4
HPV18 E2	11	211	HPV18 E5	8	63
HPV18 E2	10	231	HPV18 E5	10	63
HPV18 E2	11	188	HPV18 E5	8	62
HPV18 E2	11	336	HPV18 E5	9	62
HPV18 E2	9	134	HPV18 E5	11	62
HPV18 E2	10	134	HPV18 E5	9	58
HPV18 E2	11	134	HPV18 E5	10	22
HPV18 E2	8	197	HPV18 E5	9	35
HPV18 E2	11	123	HPV18 E5	9	61
HPV18 E2	10	141	HPV18 E5	10	61
HPV18 E2	11	322	HPV18 E5	8	1
HPV18 E2	10	96	HPV18 E5	10	1
HPV18 E2	11	96	HPV18 E5	9	14
HPV18 E2	10	124	HPV18 E5	10	14
HPV18 E2	11	173	HPV18 E5	8	21
HPV18 E2	8	143	HPV18 E5	11	21
HPV18 E2	8	135	HPV18 E5	10	60
HPV18 E2	9	135	HPV18 E5	11	60
HPV18 E2	10	135	HPV18 E5	8	3
HPV18 E2	9	164	HPV18 E5	9	25
HPV18 E2	10	164	HPV18 E5	11	25
HPV18 E2	11	164	HPV18 E5	8	51

Table X
HLA A24 Supermotif Peptides

HPV18	E5	9	51	HPV18	E6	9	93
HPV18	E5	11	51	HPV18	E6	10	93
HPV18	E5	8	54	HPV18	E6	11	93
HPV18	E5	9	54	HPV18	E6	9	98
HPV18	E5	10	54	HPV18	E6	8	95
HPV18	E5	11	54	HPV18	E6	9	95
HPV18	E5	8	36	HPV18	E6	9	22
HPV18	E5	9	42	HPV18	E6	8	111
HPV18	E5	10	34	HPV18	E6	11	111
HPV18	E5	10	41	HPV18	E6	8	7
HPV18	E5	8	52	HPV18	E6	11	7
HPV18	E5	10	52	HPV18	E6	11	11
HPV18	E5	11	52	HPV18	E6	10	3
HPV18	E5	8	33	HPV18	E6	9	126
HPV18	E5	11	33	HPV18	E6	8	74
HPV18	E5	8	15	HPV18	E6	11	59
HPV18	E5	9	15	HPV18	E6	11	24
HPV18	E5	9	53	HPV18	E6	10	84
HPV18	E5	10	53	HPV18	E6	10	89
HPV18	E5	11	53	HPV18	E6	11	89
HPV18	E6	9	48	HPV18	E6	9	37
HPV18	E6	8	68	HPV18	E6	11	37
HPV18	E6	11	68	HPV18	E6	9	44
HPV18	E6	8	105	HPV18	E6	10	44
HPV18	E6	8	18	HPV18	E6	8	38
HPV18	E6	11	18	HPV18	E6	10	38
HPV18	E6	8	32	HPV18	E6	9	33
HPV18	E6	10	32	HPV18	E6	9	85
HPV18	E6	9	70	HPV18	E7	10	85
HPV18	E6	8	27	HPV18	E7	8	6
HPV18	E6	10	16	HPV18	E7	10	6
HPV18	E6	10	51	HPV18	E7	10	63
HPV18	E6	11	88	HPV18	E7	8	24
HPV18	E6	8	46	HPV18	E7	8	82
HPV18	E6	11	46	HPV18	E7	9	82
HPV18	E6	11	29	HPV18	E7	10	82
HPV18	E6	9	20	HPV18	E7	10	40
HPV18	E6	11	20	HPV18	E7	11	90
HPV18	E6	10	77	HPV18	E7	8	14
HPV18	E6	8	40	HPV18	E7	11	11
HPV18	E6	10	40	HPV18	E7	11	73
HPV18	E6	10	43	HPV18	E7	8	89
HPV18	E6	11	43	HPV18	E7	10	74
HPV18	E6	8	53	HPV18	E7	9	92
HPV18	E6	8	71	HPV18	E7	10	22
HPV18	E6	11	71	HPV18	E7	9	88
HPV18	E6	10	97	HPV18	E7	9	7
HPV18	E6	8	120	HPV18	E7	8	93
HPV18	E6	11	120	HPV18	E7	10	12
HPV18	E6	11	80	HPV18	E7	9	75
HPV18	E6	10	30	HPV18	L1	11	63
HPV18	E6	9	13	HPV18	L1	11	128
HPV18	E6	11	117	HPV18	L1	9	218
HPV18	E6	8	92	HPV18	L1	8	310
HPV18	E6	10	92	HPV18	L1	8	2
HPV18	E6	11	92	HPV18	L1	9	2
HPV18	E6	10	36	HPV18	L1	11	2
HPV18	E6	9	52	HPV18	L1	10	441
HPV18	E6	11	102	HPV18	L1	11	350
HPV18	E6	9	41	HPV18	L1	9	284

Table X

HLA A24 Supermotif Peptides

HPV18	L1	8	122	HPV18	L1	9	428
HPV18	L1	10	122	HPV18	L1	10	428
HPV18	L1	11	520	HPV18	L1	11	428
HPV18	L1	8	512	HPV18	L1	8	11
HPV18	L1	10	512	HPV18	L1	11	11
HPV18	L1	8	433	HPV18	L1	8	58
HPV18	L1	11	433	HPV18	L1	9	437
HPV18	L1	10	260	HPV18	L1	10	94
HPV18	L1	9	263	HPV18	L1	11	94
HPV18	L1	8	276	HPV18	L1	8	40
HPV18	L1	10	276	HPV18	L1	9	40
HPV18	L1	8	396	HPV18	L1	10	40
HPV18	L1	10	396	HPV18	L1	11	40
HPV18	L1	8	330	HPV18	L1	8	39
HPV18	L1	9	330	HPV18	L1	9	39
HPV18	L1	11	478	HPV18	L1	10	39
HPV18	L1	9	448	HPV18	L1	11	39
HPV18	L1	10	203	HPV18	L1	11	46
HPV18	L1	9	211	HPV18	L1	10	47
HPV18	L1	10	211	HPV18	L1	8	219
HPV18	L1	10	294	HPV18	L1	9	9
HPV18	L1	8	87	HPV18	L1	10	9
HPV18	L1	9	87	HPV18	L1	8	32
HPV18	L1	10	87	HPV18	L1	9	32
HPV18	L1	8	167	HPV18	L1	10	32
HPV18	L1	10	280	HPV18	L1	8	443
HPV18	L1	8	431	HPV18	L1	10	443
HPV18	L1	10	431	HPV18	L1	11	443
HPV18	L1	9	308	HPV18	L1	8	360
HPV18	L1	10	308	HPV18	L1	9	360
HPV18	L1	8	436	HPV18	L1	9	151
HPV18	L1	10	436	HPV18	L1	11	151
HPV18	L1	8	49	HPV18	L1	9	143
HPV18	L1	10	49	HPV18	L1	10	143
HPV18	L1	11	49	HPV18	L1	8	529
HPV18	L1	8	321	HPV18	L1	9	516
HPV18	L1	10	508	HPV18	L1	11	516
HPV18	L1	9	95	HPV18	L1	11	507
HPV18	L1	10	95	HPV18	L1	9	505
HPV18	L1	8	145	HPV18	L1	10	125
HPV18	L1	8	535	HPV18	L1	8	291
HPV18	L1	8	177	HPV18	L1	9	48
HPV18	L1	11	177	HPV18	L1	11	48
HPV18	L1	11	342	HPV18	L1	8	367
HPV18	L1	9	233	HPV18	L1	8	8
HPV18	L1	11	326	HPV18	L1	10	8
HPV18	L1	8	383	HPV18	L1	11	8
HPV18	L1	9	383	HPV18	L1	8	14
HPV18	L1	10	165	HPV18	L1	9	14
HPV18	L1	9	175	HPV18	L1	8	103
HPV18	L1	10	175	HPV18	L1	9	103
HPV18	L1	10	467	HPV18	L1	8	445
HPV18	L1	10	265	HPV18	L1	9	445
HPV18	L1	9	320	HPV18	L1	8	104
HPV18	L1	8	38	HPV18	L1	10	159
HPV18	L1	9	38	HPV18	L1	8	33
HPV18	L1	10	38	HPV18	L1	9	33
HPV18	L1	11	38	HPV18	L1	10	64
HPV18	L1	9	13	HPV18	L1	11	64
HPV18	L1	10	13	HPV18	L1	11	17

Table X
HLA A24 Supermotif Peptides

HPV18 L1	9	21		HPV18 L1	10	6
HPV18 L1	8	336		HPV18 L1	10	135
HPV18 L1	8	3		HPV18 L1	8	81
HPV18 L1	10	3		HPV18 L1	8	288
HPV18 L1	10	307		HPV18 L1	9	288
HPV18 L1	11	307		HPV18 L1	11	288
HPV18 L1	9	261		HPV18 L1	11	93
HPV18 L1	11	261		HPV18 L1	8	459
HPV18 L1	10	36		HPV18 L1	9	31
HPV18 L1	11	36		HPV18 L1	10	31
HPV18 L1	11	84		HPV18 L1	11	31
HPV18 L1	9	253		HPV18 L1	9	359
HPV18 L1	8	510		HPV18 L1	10	359
HPV18 L1	10	510		HPV18 L1	10	150
HPV18 L1	9	54		HPV18 L1	9	518
HPV18 L1	11	54		HPV18 L1	8	475
HPV18 L1	8	52		HPV18 L1	9	335
HPV18 L1	9	52		HPV18 L1	11	306
HPV18 L1	11	52		HPV18 L1	10	455
HPV18 L1	11	207		HPV18 L1	10	408
HPV18 L1	8	57		HPV18 L1	11	78
HPV18 L1	9	57		HPV18 L1	9	209
HPV18 L1	8	282		HPV18 L1	11	209
HPV18 L1	11	282		HPV18 L1	10	451
HPV18 L1	9	248		HPV18 L1	11	451
HPV18 L1	11	173		HPV18 L1	9	442
HPV18 L1	8	28		HPV18 L1	11	442
HPV18 L1	9	28		HPV18 L1	11	273
HPV18 L1	8	26		HPV18 L1	9	444
HPV18 L1	10	26		HPV18 L1	10	444
HPV18 L1	11	26		HPV18 L1	10	327
HPV18 L1	10	240		HPV18 L1	11	327
HPV18 L1	8	20		HPV18 L1	9	397
HPV18 L1	10	20		HPV18 L1	8	473
HPV18 L1	9	472		HPV18 L1	10	473
HPV18 L1	11	472		HPV18 L1	8	254
HPV18 L1	11	412		HPV18 L1	8	331
HPV18 L1	8	502		HPV18 L1	11	393
HPV18 L1	8	302		HPV18 L1	10	479
HPV18 L1	10	302		HPV18 L1	8	55
HPV18 L1	9	435		HPV18 L1	10	55
HPV18 L1	11	435		HPV18 L1	11	55
HPV18 L1	11	216		HPV18 L1	8	7
HPV18 L1	8	315		HPV18 L1	9	7
HPV18 L1	8	366		HPV18 L1	11	7
HPV18 L1	9	366		HPV18 L1	8	449
HPV18 L1	8	137		HPV18 L1	8	89
HPV18 L1	10	137		HPV18 L1	8	361
HPV18 L1	11	297		HPV18 L1	10	394
HPV18 L1	10	416		HPV18 L1	9	160
HPV18 L1	8	523		HPV18 L1	8	34
HPV18 L1	9	523		HPV18 L1	10	351
HPV18 L1	9	130		HPV18 L1	9	452
HPV18 L1	9	424		HPV18 L1	10	452
HPV18 L1	11	424		HPV18 L1	9	295
HPV18 L1	8	481		HPV18 L1	11	35
HPV18 L1	9	102		HPV18 L1	9	4
HPV18 L1	10	102		HPV18 L1	11	4
HPV18 L1	11	158		HPV18 L1	8	88
HPV18 L1	9	6		HPV18 L1	9	88

Table X
HLA A24 Supermotif Peptides

Peptide	Length	Position		Peptide	Length	Position
HPV18 L2	9	255		HPV18 L2	8	52
HPV18 L2	11	255		HPV18 L2	9	279
HPV18 L2	9	370		HPV18 L2	9	44
HPV18 L2	8	161		HPV18 L2	10	44
HPV18 L2	11	286		HPV18 L2	11	44
HPV18 L2	8	341		HPV18 L2	10	405
HPV18 L2	10	341		HPV18 L2	10	143
HPV18 L2	11	341		HPV18 L2	8	249
HPV18 L2	11	303		HPV18 L2	8	43
HPV18 L2	8	275		HPV18 L2	10	43
HPV18 L2	10	278		HPV18 L2	11	43
HPV18 L2	11	322		HPV18 L2	11	34
HPV18 L2	11	404		HPV18 L2	9	347
HPV18 L2	11	142		HPV18 L2	9	248
HPV18 L2	10	346		HPV18 L2	8	242
HPV18 L2	11	83		HPV18 L2	10	242
HPV18 L2	8	270		HPV18 L2	10	287
HPV18 L2	10	270		HPV18 L2	10	391
HPV18 L2	11	270		HPV18 L2	10	338
HPV18 L2	10	396		HPV18 L2	11	338
HPV18 L2	11	30		HPV18 L2	8	437
HPV18 L2	9	240		HPV18 L2	9	305
HPV18 L2	10	240		HPV18 L2	10	386
HPV18 L2	8	331		HPV18 L2	8	325
HPV18 L2	8	371		HPV18 L2	9	325
HPV18 L2	11	443		HPV18 L2	11	325
HPV18 L2	8	241		HPV18 L2	11	390
HPV18 L2	9	241		HPV18 L2	11	337
HPV18 L2	11	241		HPV18 L2	9	419
HPV18 L2	9	122		HPV18 L2	10	419
HPV18 L2	11	157		HPV18 L2	9	98
HPV18 L2	8	306		HPV18 L2	10	98
HPV18 L2	8	319		HPV18 L2	9	120
HPV18 L2	9	51		HPV18 L2	11	120
HPV18 L2	8	429		HPV18 L2	9	376
HPV18 L2	9	429		HPV18 L2	8	86
HPV18 L2	10	429		HPV18 L2	8	185
HPV18 L2	8	64		HPV18 L2	11	185
HPV18 L2	9	64		HPV18 L2	11	216
HPV18 L2	11	64		HPV18 L2	8	258
HPV18 L2	8	188		HPV18 L2	9	95
HPV18 L2	10	188		HPV18 L2	10	360
HPV18 L2	9	432		HPV18 L2	8	398
HPV18 L2	10	432		HPV18 L2	10	398
HPV18 L2	11	432		HPV18 L2	8	452
HPV18 L2	10	183		HPV18 L2	8	312
HPV18 L2	10	310		HPV18 L2	9	312
HPV18 L2	11	310		HPV18 L2	10	172
HPV18 L2	8	37		HPV18 L2	9	233
HPV18 L2	9	37		HPV18 L2	10	233
HPV18 L2	11	37		HPV18 L2	8	46
HPV18 L2	8	134		HPV18 L2	9	46
HPV18 L2	10	134		HPV18 L2	10	426
HPV18 L2	8	292		HPV18 L2	11	426
HPV18 L2	10	191		HPV18 L2	11	295
HPV18 L2	9	318		HPV18 L2	8	298
HPV18 L2	8	434		HPV18 L2	9	298
HPV18 L2	9	434		HPV18 L2	8	220
HPV18 L2	10	434		HPV18 L2	8	316
HPV18 L2	11	434		HPV18 L2	11	316

Table X
HLA A24 Supermotif Peptides

HPV18	L2	10	450	HPV31	E1	10	620
HPV18	L2	11	368	HPV31	E1	8	508
HPV18	L2	9	49	HPV31	E1	9	508
HPV18	L2	11	49	HPV31	E1	9	49
HPV18	L2	10	247	HPV31	E1	8	96
HPV18	L2	11	147	HPV31	E1	10	96
HPV18	L2	10	153	HPV31	E1	8	421
HPV18	L2	8	365	HPV31	E1	11	421
HPV18	L2	10	365	HPV31	E1	8	336
HPV18	L2	8	409	HPV31	E1	10	336
HPV18	L2	8	235	HPV31	E1	9	42
HPV18	L2	9	149	HPV31	E1	10	42
HPV18	L2	9	383	HPV31	E1	9	332
HPV18	L2	8	121	HPV31	E1	8	528
HPV18	L2	10	121	HPV31	E1	10	528
HPV18	L2	8	377	HPV31	E1	8	348
HPV18	L2	9	39	HPV31	E1	10	348
HPV18	L2	9	406	HPV31	E1	9	311
HPV18	L2	11	406	HPV31	E1	10	311
HPV18	L2	10	304	HPV31	E1	8	418
HPV18	L2	8	38	HPV31	E1	9	418
HPV18	L2	10	38	HPV31	E1	11	418
HPV18	L2	9	154	HPV31	E1	8	102
HPV18	L2	8	136	HPV31	E1	11	102
HPV18	L2	9	366	HPV31	E1	9	432
HPV18	L2	9	135	HPV31	E1	11	432
HPV18	L2	8	388	HPV31	E1	9	354
HPV18	L2	10	217	HPV31	E1	10	583
HPV18	L2	11	217	HPV31	E1	11	583
HPV18	L2	10	113	HPV31	E1	8	193
HPV18	L2	9	387	HPV31	E1	10	193
HPV18	L2	10	31	HPV31	E1	11	193
HPV18	L2	11	112	HPV31	E1	8	168
HPV18	L2	9	399	HPV31	E1	11	168
HPV18	L2	9	427	HPV31	E1	9	318
HPV18	L2	10	427	HPV31	E1	9	592
HPV18	L2	11	427	HPV31	E1	11	592
HPV18	L2	8	436	HPV31	E1	8	50
HPV18	L2	9	436	HPV31	E1	11	443
HPV18	L2	8	400	HPV31	E1	10	372
HPV18	L2	8	435	HPV31	E1	9	473
HPV18	L2	9	435	HPV31	E1	9	425
HPV18	L2	10	435	HPV31	E1	8	436
HPV31	E1	11	371	HPV31	E1	9	436
HPV31	E1	9	519	HPV31	E1	8	199
HPV31	E1	10	533	HPV31	E1	9	566
HPV31	E1	11	533	HPV31	E1	8	433
HPV31	E1	9	298	HPV31	E1	10	433
HPV31	E1	9	186	HPV31	E1	11	433
HPV31	E1	10	186	HPV31	E1	11	488
HPV31	E1	8	504	HPV31	E1	9	230
HPV31	E1	9	504	HPV31	E1	11	230
HPV31	E1	11	22	HPV31	E1	11	499
HPV31	E1	9	81	HPV31	E1	8	467
HPV31	E1	8	279	HPV31	E1	9	305
HPV31	E1	9	279	HPV31	E1	10	252
HPV31	E1	9	239	HPV31	E1	8	11
HPV31	E1	9	284	HPV31	E1	9	11
HPV31	E1	9	213	HPV31	E1	10	225
HPV31	E1	10	100	HPV31	E1	11	225

275

Table X
HLA A24 Supermotif Peptides

HPV31	E1	8	446	HPV31	E1	9	253
HPV31	E1	9	446	HPV31	E1	11	143
HPV31	E1	10	446	HPV31	E1	11	340
HPV31	E1	8	196	HPV31	E1	10	547
HPV31	E1	11	196	HPV31	E1	9	104
HPV31	E1	10	222	HPV31	E1	11	104
HPV31	E1	9	16	HPV31	E1	9	135
HPV31	E1	9	243	HPV31	E1	9	460
HPV31	E1	11	243	HPV31	E1	11	460
HPV31	E1	11	510	HPV31	E1	10	588
HPV31	E1	10	391	HPV31	E1	10	573
HPV31	E1	11	478	HPV31	E1	9	492
HPV31	E1	10	268	HPV31	E1	10	492
HPV31	E1	11	268	HPV31	E1	8	541
HPV31	E1	8	381	HPV31	E1	11	93
HPV31	E1	10	422	HPV31	E1	9	170
HPV31	E1	10	190	HPV31	E1	11	524
HPV31	E1	11	190	HPV31	E1	10	580
HPV31	E1	8	424	HPV31	E1	8	237
HPV31	E1	10	424	HPV31	E1	11	237
HPV31	E1	9	380	HPV31	E1	10	557
HPV31	E1	10	276	HPV31	E1	8	430
HPV31	E1	11	276	HPV31	E1	11	430
HPV31	E1	9	272	HPV31	E1	8	536
HPV31	E1	9	291	HPV31	E1	9	536
HPV31	E1	10	291	HPV31	E1	8	399
HPV31	E1	11	291	HPV31	E1	8	323
HPV31	E1	8	119	HPV31	E1	9	145
HPV31	E1	10	119	HPV31	E1	9	342
HPV31	E1	9	232	HPV31	E1	9	260
HPV31	E1	10	232	HPV31	E1	11	260
HPV31	E1	9	179	HPV31	E1	8	267
HPV31	E1	10	179	HPV31	E1	11	267
HPV31	E1	8	412	HPV31	E1	10	124
HPV31	E1	11	412	HPV31	E1	11	562
HPV31	E1	10	88	HPV31	E1	11	303
HPV31	E1	9	125	HPV31	E1	8	595
HPV31	E1	9	470	HPV31	E1	9	555
HPV31	E1	10	470	HPV31	E1	10	427
HPV31	E1	9	277	HPV31	E1	11	427
HPV31	E1	10	277	HPV31	E1	10	591
HPV31	E1	11	277	HPV31	E1	8	472
HPV31	E1	8	273	HPV31	E1	10	472
HPV31	E1	8	234	HPV31	E1	8	435
HPV31	E1	11	234	HPV31	E1	9	435
HPV31	E1	9	534	HPV31	E1	10	435
HPV31	E1	10	534	HPV31	E1	9	198
HPV31	E1	11	534	HPV31	E1	9	329
HPV31	E1	11	258	HPV31	E1	9	526
HPV31	E1	10	563	HPV31	E1	10	526
HPV31	E1	8	240	HPV31	E1	8	246
HPV31	E1	9	194	HPV31	E1	10	246
HPV31	E1	10	194	HPV31	E1	11	246
HPV31	E1	8	299	HPV31	E1	10	469
HPV31	E1	11	299	HPV31	E1	11	469
HPV31	E1	10	500	HPV31	E1	8	294
HPV31	E1	8	187	HPV31	E1	9	294
HPV31	E1	9	187	HPV31	E1	11	211
HPV31	E1	8	285	HPV31	E1	11	616
HPV31	E1	11	47	HPV31	E1	8	250

Table X

HLA A24 Supermotif Peptides

HPV31	E1	9	250		HPV31	E2	8	124
HPV31	E1	9	480		HPV31	E2	11	124
HPV31	E1	10	480		HPV31	E2	9	91
HPV31	E1	11	480		HPV31	E2	11	91
HPV31	E1	8	464		HPV31	E2	8	31
HPV31	E1	10	464		HPV31	E2	11	204
HPV31	E1	11	464		HPV31	E2	9	74
HPV31	E1	10	334		HPV31	E2	11	100
HPV31	E1	10	617		HPV31	E2	8	80
HPV31	E1	8	567		HPV31	E2	9	185
HPV31	E1	9	269		HPV31	E2	11	185
HPV31	E1	10	269		HPV31	E2	9	86
HPV31	E1	8	233		HPV31	E2	8	171
HPV31	E1	9	233		HPV31	E2	11	168
HPV31	E1	8	333		HPV31	E2	10	156
HPV31	E1	11	333		HPV31	E2	8	114
HPV31	E1	8	505		HPV31	E2	8	29
HPV31	E1	11	505		HPV31	E2	10	29
HPV31	E1	9	226		HPV31	E2	8	35
HPV31	E1	10	226		HPV31	E2	9	35
HPV31	E1	8	565		HPV31	E2	10	35
HPV31	E1	10	565		HPV31	E2	8	164
HPV31	E1	10	23		HPV31	E2	8	297
HPV31	E1	11	84		HPV31	E2	9	297
HPV31	E1	11	177		HPV31	E2	9	18
HPV31	E1	11	325		HPV31	E2	8	130
HPV31	E1	9	349		HPV31	E2	9	130
HPV31	E1	11	349		HPV31	E2	10	130
HPV31	E1	8	254		HPV31	E2	10	295
HPV31	E1	9	223		HPV31	E2	11	295
HPV31	E1	9	564		HPV31	E2	9	304
HPV31	E1	11	564		HPV31	E2	8	193
HPV31	E1	9	581		HPV31	E2	9	157
HPV31	E1	8	312		HPV31	E2	11	157
HPV31	E1	9	312		HPV31	E2	11	183
HPV31	E1	8	17		HPV31	E2	8	177
HPV31	E1	8	319		HPV31	E2	8	42
HPV31	E1	10	489		HPV31	E2	10	42
HPV31	E1	9	301		HPV31	E2	8	103
HPV31	E1	9	465		HPV31	E2	9	318
HPV31	E1	10	465		HPV31	E2	11	318
HPV31	E1	10	511		HPV31	E2	10	101
HPV31	E1	9	558		HPV31	E2	10	78
HPV31	E1	11	558		HPV31	E2	11	77
HPV31	E1	9	89		HPV31	E2	9	43
HPV31	E1	10	300		HPV31	E2	9	170
HPV31	E2	8	72		HPV31	E2	8	303
HPV31	E2	11	72		HPV31	E2	10	303
HPV31	E2	8	338		HPV31	E2	9	84
HPV31	E2	9	69		HPV31	E2	11	84
HPV31	E2	10	69		HPV31	E2	8	254
HPV31	E2	11	69		HPV31	E2	9	254
HPV31	E2	10	61		HPV31	E2	8	127
HPV31	E2	8	291		HPV31	E2	10	127
HPV31	E2	10	286		HPV31	E2	11	127
HPV31	E2	11	286		HPV31	E2	9	361
HPV31	E2	9	307		HPV31	E2	10	361
HPV31	E2	10	330		HPV31	E2	8	9
HPV31	E2	10	40		HPV31	E2	11	9
HPV31	E2	8	352		HPV31	E2	9	133

Table X
HLA A24 Supermotif Peptides

Protein	Length	Position		Protein	Length	Position
HPV31 E2	11	294		HPV31 E5	9	40
HPV31 E2	10	106		HPV31 E5	10	40
HPV31 E2	10	120		HPV31 E5	11	40
HPV31 E2	10	317		HPV31 E5	8	53
HPV31 E2	8	96		HPV31 E5	10	53
HPV31 E2	10	191		HPV31 E5	11	53
HPV31 E2	8	151		HPV31 E5	8	59
HPV31 E2	9	151		HPV31 E5	9	59
HPV31 E2	8	321		HPV31 E5	10	59
HPV31 E2	8	25		HPV31 E5	11	59
HPV31 E2	9	25		HPV31 E5	10	18
HPV31 E2	8	37		HPV31 E5	9	14
HPV31 E2	9	7		HPV31 E5	10	14
HPV31 E2	10	7		HPV31 E5	11	14
HPV31 E2	8	311		HPV31 E5	8	61
HPV31 E2	9	311		HPV31 E5	9	61
HPV31 E2	10	309		HPV31 E5	11	61
HPV31 E2	11	309		HPV31 E5	9	26
HPV31 E2	9	206		HPV31 E5	8	20
HPV31 E2	10	53		HPV31 E5	10	20
HPV31 E2	8	346		HPV31 E5	9	3
HPV31 E2	9	346		HPV31 E5	11	3
HPV31 E2	10	266		HPV31 E5	9	66
HPV31 E2	8	198		HPV31 E5	8	15
HPV31 E2	10	198		HPV31 E5	9	15
HPV31 E2	8	63		HPV31 E5	10	15
HPV31 E2	11	63		HPV31 E5	9	24
HPV31 E2	9	364		HPV31 E5	11	24
HPV31 E2	9	128		HPV31 E5	9	72
HPV31 E2	10	128		HPV31 E5	10	72
HPV31 E2	11	128		HPV31 E5	10	48
HPV31 E2	9	93		HPV31 E5	9	11
HPV31 E2	10	93		HPV31 E5	8	67
HPV31 E2	11	93		HPV31 E5	8	62
HPV31 E2	10	221		HPV31 E5	10	62
HPV31 E2	11	220		HPV31 E5	11	62
HPV31 E2	8	362		HPV31 E5	10	23
HPV31 E2	9	362		HPV31 E5	10	71
HPV31 E2	11	362		HPV31 E5	11	71
HPV31 E2	11	343		HPV31 E5	8	45
HPV31 E2	9	199		HPV31 E5	8	16
HPV31 E2	9	192		HPV31 E5	9	16
HPV31 E2	9	41		HPV31 E5	8	22
HPV31 E2	11	41		HPV31 E5	11	22
HPV31 E2	11	147		HPV31 E5	9	44
HPV31 E2	8	92		HPV31 E5	8	43
HPV31 E2	10	92		HPV31 E5	10	43
HPV31 E2	11	92		HPV31 E5	8	42
HPV31 E2	10	344		HPV31 E5	9	42
HPV31 E2	11	344		HPV31 E5	11	42
HPV31 E2	9	102		HPV31 E5	8	27
HPV31 E2	8	131		HPV31 E5	8	32
HPV31 E2	9	131		HPV31 E5	11	32
HPV31 E2	11	131		HPV31 E5	9	49
HPV31 E2	9	159		HPV31 E5	11	1
HPV31 E2	10	159		HPV31 E5	9	5
HPV31 E2	11	32		HPV31 E5	11	5
HPV31 E2	8	158		HPV31 E5	11	70
HPV31 E2	10	158		HPV31 E5	8	56
HPV31 E2	11	158		HPV31 E5	11	56

Table X
HLA A24 Supermotif Peptides

Protein			Protein		
HPV31 E5	9	31	HPV31 E6	11	69
HPV31 E5	8	10	HPV31 E6	10	95
HPV31 E5	10	10	HPV31 E6	9	61
HPV31 E5	9	7	HPV31 E6	10	61
HPV31 E5	10	7	HPV31 E6	8	118
HPV31 E5	11	7	HPV31 E6	11	118
HPV31 E5	8·	35	HPV31 E6	9	11
HPV31 E5	9	35	HPV31 E6	11	11
HPV31 E5	10	35	HPV31 E6	10	90
HPV31 E5	11	35	HPV31 E6	11	90
HPV31 E5	8	37	HPV31 E6	8	72
HPV31 E5	9	37	HPV31 E6	10	72
HPV31 E5	10	37	HPV31 E6	11	100
HPV31 E5	8	41	HPV31 E6	9	37
HPV31 E5	9	41	HPV31 E6	11	37
HPV31 E5	10	41	HPV31 E6	9	91
HPV31 E5	8	8	HPV31 E6	10	91
HPV31 E5	9	8	HPV31 E6	11	91
HPV31 E5	10	8	HPV31 E6	11	127
HPV31 E5	8	65	HPV31 E6	11	109
HPV31 E5	10	65	HPV31 E6	11	22
HPV31 E5	10	51	HPV31 E6	8	36
HPV31 E5	8	73	HPV31 E6	10	36
HPV31 E5	9	73	HPV31 E6	9	124
HPV31 E5	11	47	HPV31 E6	9	68
HPV31 E5	8	12	HPV31 E6	11	68
HPV31 E5	11	12	HPV31 E6	11	27
HPV31 E5	9	21	HPV31 E6	10	131
HPV31 E5	10	33	HPV31 E6	8	77
HPV31 E5	11	33	HPV31 E6	9	80
HPV31 E5	8	64	HPV31 E6	10	82
HPV31 E5	9	64	HPV31 E6	10	87
HPV31 E5	11	64	HPV31 E6	11	86
HPV31 E5	8	38	HPV31 E6	9	42
HPV31 E5	9	38	HPV31 E6	11	42
HPV31 E5	11	38	HPV31 E6	9	83
HPV31 E5	8	50	HPV31 E6	9	132
HPV31 E5	11	50	HPV31 E6	11	78
HPV31 E5	9	63	HPV31 E7	10	19
HPV31 E5	10	63	HPV31 E7	9	68
HPV31 E6	9	46	HPV31 E7	11	68
HPV31 E6	9	18	HPV31 E7	8	75
HPV31 E6	11	18	HPV31 E7	9	75
HPV31 E6	8	103	HPV31 E7	10	75
HPV31 E6	11	66	HPV31 E7	8	21
HPV31 E6	8	63	HPV31 E7	9	14
HPV31 E6	8	30	HPV31 E7	10	48
HPV31 E6	9	44	HPV31 E7	9	81
HPV31 E6	11	44	HPV31 E7	8	4
HPV31 E6	11	57	HPV31 E7	10	4
HPV31 E6	10	75	HPV31 E7	11	88
HPV31 E6	9	20	HPV31 E7	10	78
HPV31 E6	8	25	HPV31 E7	10	89
HPV31 E6	8	14	HPV31 E7	8	82
HPV31 E6	10	14	HPV31 E7	8	6
HPV31 E6	9	39	HPV31 E7	10	6
HPV31 E6	10	41	HPV31 E7	10	73
HPV31 E6	8	47	HPV31 E7	11	73
HPV31 E6	8	69	HPV31 E7	8	77
HPV31 E6	10	69	HPV31 E7	11	77

Table X
HLA A24 Supermotif Peptides

HPV31	E7	11	66		HPV31	L1	8	141
HPV31	E7	8	71		HPV31	L1	10	141
HPV31	E7	9	71		HPV31	L1	11	266
HPV31	E7	10	56		HPV31	L1	9	115
HPV31	E7	9	7		HPV31	L1	10	115
HPV31	E7	11	12		HPV31	L1	8	474
HPV31	E7	11	55		HPV31	L1	8	307
HPV31	L1	9	348		HPV31	L1	9	376
HPV31	L1	8	398		HPV31	L1	9	399
HPV31	L1	10	398		HPV31	L1	8	388
HPV31	L1	10	180		HPV31	L1	8	382
HPV31	L1	11	213		HPV31	L1	10	382
HPV31	L1	8	285		HPV31	L1	11	382
HPV31	L1	9	285		HPV31	L1	9	181
HPV31	L1	11	147		HPV31	L1	11	181
HPV31	L1	9	158		HPV31	L1	9	61
HPV31	L1	9	224		HPV31	L1	11	61
HPV31	L1	9	387		HPV31	L1	10	33
HPV31	L1	11	459		HPV31	L1	11	33
HPV31	L1	8	372		HPV31	L1	11	126
HPV31	L1	11	372		HPV31	L1	9	83
HPV31	L1	10	200		HPV31	L1	10	83
HPV31	L1	8	129		HPV31	L1	8	468
HPV31	L1	9	203		HPV31	L1	9	455
HPV31	L1	8	216		HPV31	L1	11	455
HPV31	L1	10	216		HPV31	L1	8	381
HPV31	L1	9	353		HPV31	L1	9	381
HPV31	L1	8	336		HPV31	L1	11	381
HPV31	L1	11	417		HPV31	L1	10	60
HPV31	L1	9	151		HPV31	L1	11	237
HPV31	L1	10	151		HPV31	L1	10	65
HPV31	L1	10	234		HPV31	L1	8	20
HPV31	L1	9	444		HPV31	L1	8	231
HPV31	L1	8	370		HPV31	L1	10	247
HPV31	L1	10	370		HPV31	L1	11	247
HPV31	L1	8	107		HPV31	L1	8	159
HPV31	L1	8	449		HPV31	L1	8	42
HPV31	L1	9	363		HPV31	L1	9	42
HPV31	L1	11	363		HPV31	L1	11	42
HPV31	L1	8	26		HPV31	L1	9	407
HPV31	L1	9	26		HPV31	L1	8	43
HPV31	L1	10	26		HPV31	L1	10	43
HPV31	L1	9	248		HPV31	L1	8	99
HPV31	L1	10	248		HPV31	L1	10	3
HPV31	L1	8	375		HPV31	L1	11	3
HPV31	L1	10	375		HPV31	L1	11	389
HPV31	L1	10	447		HPV31	L1	10	238
HPV31	L1	8	249		HPV31	L1	11	238
HPV31	L1	9	249		HPV31	L1	9	201
HPV31	L1	9	91		HPV31	L1	11	201
HPV31	L1	11	91		HPV31	L1	8	300
HPV31	L1	10	205		HPV31	L1	9	300
HPV31	L1	8	85		HPV31	L1	11	32
HPV31	L1	8	323		HPV31	L1	10	451
HPV31	L1	9	323		HPV31	L1	8	342
HPV31	L1	8	117		HPV31	L1	10	220
HPV31	L1	11	117		HPV31	L1	8	441
HPV31	L1	10	105		HPV31	L1	8	222
HPV31	L1	11	68		HPV31	L1	11	222
HPV31	L1	10	406		HPV31	L1	9	188

Table X
HLA A24 Supermotif Peptides

HPV31 L1	8	464	HPV31 L1	11	446
HPV31 L1	11	113	HPV31 L1	8	28
HPV31 L1	11	17	HPV31 L1	8	301
HPV31 L1	8	242	HPV31 L1	10	334
HPV31 L1	9	242	HPV31 L1	8	62
HPV31 L1	10	242	HPV31 L1	10	62
HPV31 L1	9	374	HPV31 L1	9	292
HPV31 L1	11	374	HPV31 L1	9	391
HPV31 L1	8	462	HPV31 L1	10	391
HPV31 L1	9	452	HPV31 L1	11	277
HPV31 L1	10	462	HPV31 L1	9	235
HPV31 L1	8	306	HPV31 L1	8	364
HPV31 L1	9	306	HPV31 L1	10	364
HPV31 L1	11	378	HPV31 L1	8	250
HPV31 L1	11	156	HPV31 L1	8	445
HPV31 L1	8	255	HPV31 L1	8	27
HPV31 L1	9	70	HPV31 L1	9	27
HPV31 L1	8	420	HPV31 L1	9	34
HPV31 L1	9	41	HPV31 L1	10	34
HPV31 L1	10	41	HPV31 L2	11	286
HPV31 L1	8	77	HPV31 L2	9	311
HPV31 L1	10	77	HPV31 L2	10	311
HPV31 L1	9	98	HPV31 L2	11	311
HPV31 L1	10	75	HPV31 L2	8	226
HPV31 L1	10	90	HPV31 L2	10	135
HPV31 L1	8	228	HPV31 L2	11	135
HPV31 L1	9	228	HPV31 L2	11	342
HPV31 L1	11	228	HPV31 L2	11	376
HPV31 L1	11	51	HPV31 L2	11	251
HPV31 L1	8	414	HPV31 L2	11	385
HPV31 L1	11	2	HPV31 L2	8	275
HPV31 L1	9	149	HPV31 L2	8	438
HPV31 L1	11	149	HPV31 L2	9	438
HPV31 L1	10	394	HPV31 L2	10	438
HPV31 L1	9	299	HPV31 L2	11	438
HPV31 L1	10	299	HPV31 L2	10	278
HPV31 L1	10	283	HPV31 L2	8	354
HPV31 L1	11	283	HPV31 L2	8	116
HPV31 L1	11	23	HPV31 L2	11	31
HPV31 L1	10	340	HPV31 L2	8	190
HPV31 L1	11	290	HPV31 L2	8	171
HPV31 L1	8	194	HPV31 L2	9	253
HPV31 L1	8	271	HPV31 L2	10	253
HPV31 L1	10	355	HPV31 L2	11	253
HPV31 L1	11	355	HPV31 L2	10	196
HPV31 L1	8	286	HPV31 L2	8	237
HPV31 L1	11	246	HPV31 L2	9	237
HPV31 L1	9	383	HPV31 L2	11	237
HPV31 L1	10	383	HPV31 L2	8	433
HPV31 L1	8	354	HPV31 L2	9	433
HPV31 L1	11	354	HPV31 L2	8	439
HPV31 L1	8	408	HPV31 L2	9	439
HPV31 L1	10	267	HPV31 L2	10	439
HPV31 L1	11	267	HPV31 L2	11	113
HPV31 L1	9	44	HPV31 L2	11	351
HPV31 L1	11	333	HPV31 L2	8	26
HPV31 L1	10	291	HPV31 L2	11	26
HPV31 L1	10	390	HPV31 L2	8	65
HPV31 L1	11	390	HPV31 L2	11	65
HPV31 L1	10	418	HPV31 L2	9	52

Table X

HLA A24 Supermotif Peptides

HPV31	L2	8	213		HPV31	L2	11	303
HPV31	L2	10	213		HPV31	L2	9	229
HPV31	L2	11	213		HPV31	L2	10	229
HPV31	L2	9	175		HPV31	L2	11	429
HPV31	L2	8	38		HPV31	L2	8	298
HPV31	L2	9	38		HPV31	L2	10	9
HPV31	L2	11	38		HPV31	L2	11	9
HPV31	L2	9	318		HPV31	L2	8	306
HPV31	L2	9	403		HPV31	L2	8	316
HPV31	L2	8	432		HPV31	L2	11	316
HPV31	L2	9	432		HPV31	L2	8	47
HPV31	L2	10	432		HPV31	L2	9	47
HPV31	L2	9	279		HPV31	L2	11	295
HPV31	L2	10	45		HPV31	L2	8	94
HPV31	L2	11	45		HPV31	L2	9	431
HPV31	L2	8	245		HPV31	L2	10	431
HPV31	L2	10	114		HPV31	L2	11	431
HPV31	L2	10	105		HPV31	L2	9	325
HPV31	L2	9	197		HPV31	L2	11	325
HPV31	L2	11	35		HPV31	L2	10	86
HPV31	L2	8	231		HPV31	L2	10	182
HPV31	L2	9	244		HPV31	L2	11	104
HPV31	L2	8	176		HPV31	L2	8	107
HPV31	L2	10	287		HPV31	L2	11	260
HPV31	L2	10	352		HPV31	L2	9	50
HPV31	L2	10	261		HPV31	L2	11	50
HPV31	L2	11	447		HPV31	L2	8	396
HPV31	L2	8	269		HPV31	L2	9	396
HPV31	L2	9	269		HPV31	L2	8	151
HPV31	L2	11	269		HPV31	L2	8	184
HPV31	L2	8	204		HPV31	L2	10	184
HPV31	L2	10	390		HPV31	L2	8	346
HPV31	L2	8	292		HPV31	L2	10	346
HPV31	L2	10	187		HPV31	L2	11	346
HPV31	L2	11	187		HPV31	L2	8	379
HPV31	L2	10	410		HPV31	L2	8	80
HPV31	L2	10	402		HPV31	L2	10	80
HPV31	L2	11	210		HPV31	L2	10	149
HPV31	L2	11	122		HPV31	L2	11	195
HPV31	L2	8	88		HPV31	L2	9	236
HPV31	L2	11	422		HPV31	L2	10	236
HPV31	L2	9	100		HPV31	L2	8	157
HPV31	L2	8	394		HPV31	L2	9	40
HPV31	L2	10	394		HPV31	L2	8	312
HPV31	L2	11	394		HPV31	L2	9	312
HPV31	L2	10	235		HPV31	L2	10	312
HPV31	L2	11	235		HPV31	L2	9	347
HPV31	L2	9	156		HPV31	L2	10	347
HPV31	L2	8	388		HPV31	L2	10	304
HPV31	L2	10	167		HPV31	L2	9	136
HPV31	L2	11	167		HPV31	L2	10	136
HPV31	L2	9	415		HPV31	L2	8	39
HPV31	L2	8	425		HPV31	L2	10	39
HPV31	L2	9	425		HPV31	L2	8	426
HPV31	L2	8	127		HPV31	L2	9	344
HPV31	L2	9	97		HPV31	L2	10	344
HPV31	L2	10	92		HPV31	L2	10	343
HPV31	L2	8	44		HPV31	L2	11	343
HPV31	L2	11	44		HPV31	L2	9	391
HPV31	L2	10	243		HPV31	L2	11	391

Table X
HLA A24 Supermotif Peptides

HPV31	L2	8	254	HPV33	E1	11	352
HPV31	L2	9	254	HPV33	E1	10	38
HPV31	L2	10	254	HPV33	E1	11	38
HPV31	L2	8	392	HPV33	E1	11	295
HPV31	L2	10	392	HPV33	E1	9	331
HPV31	L2	9	81	HPV33	E1	9	605
HPV31	L2	8	53	HPV33	E1	11	605
HPV31	L2	10	32	HPV33	E1	10	50
HPV31	L2	9	262	HPV33	E1	8	449
HPV31	L2	8	440	HPV33	E1	9	449
HPV31	L2	9	440	HPV33	E1	11	456
HPV31	L2	10	386	HPV33	E1	10	385
HPV31	L2	8	319	HPV33	E1	8	212
HPV33	E1	9	452	HPV33	E1	8	446
HPV33	E1	9	448	HPV33	E1	11	446
HPV33	E1	10	448	HPV33	E1	11	501
HPV33	E1	11	384	HPV33	E1	8	265
HPV33	E1	10	596	HPV33	E1	10	265
HPV33	E1	11	596	HPV33	E1	8	459
HPV33	E1	9	532	HPV33	E1	9	459
HPV33	E1	10	546	HPV33	E1	10	459
HPV33	E1	11	546	HPV33	E1	11	209
HPV33	E1	9	311	HPV33	E1	10	235
HPV33	E1	9	81	HPV33	E1	8	11
HPV33	E1	11	22	HPV33	E1	9	512
HPV33	E1	9	207	HPV33	E1	11	512
HPV33	E1	8	259	HPV33	E1	8	480
HPV33	E1	9	259	HPV33	E1	8	44
HPV33	E1	10	259	HPV33	E1	8	564
HPV33	E1	11	259	HPV33	E1	9	564
HPV33	E1	9	297	HPV33	E1	10	327
HPV33	E1	9	226	HPV33	E1	9	16
HPV33	E1	11	226	HPV33	E1	11	256
HPV33	E1	11	14	HPV33	E1	10	404
HPV33	E1	8	118	HPV33	E1	10	347
HPV33	E1	11	118	HPV33	E1	9	266
HPV33	E1	8	494	HPV33	E1	8	267
HPV33	E1	9	494	HPV33	E1	9	200
HPV33	E1	10	494	HPV33	E1	11	200
HPV33	E1	9	367	HPV33	E1	8	394
HPV33	E1	10	46	HPV33	E1	10	435
HPV33	E1	8	78	HPV33	E1	8	203
HPV33	E1	8	349	HPV33	E1	10	203
HPV33	E1	10	349	HPV33	E1	11	203
HPV33	E1	8	62	HPV33	E1	10	124
HPV33	E1	9	62	HPV33	E1	11	510
HPV33	E1	11	62	HPV33	E1	8	393
HPV33	E1	10	541	HPV33	E1	9	393
HPV33	E1	9	324	HPV33	E1	9	285
HPV33	E1	10	324	HPV33	E1	9	304
HPV33	E1	9	516	HPV33	E1	10	304
HPV33	E1	10	516	HPV33	E1	11	304
HPV33	E1	9	228	HPV33	E1	8	412
HPV33	E1	11	49	HPV33	E1	8	425
HPV33	E1	8	580	HPV33	E1	11	425
HPV33	E1	9	445	HPV33	E1	9	223
HPV33	E1	11	537	HPV33	E1	9	245
HPV33	E1	8	361	HPV33	E1	10	245
HPV33	E1	10	361	HPV33	E1	11	69
HPV33	E1	11	361	HPV33	E1	8	247

Table X
HLA A24 Supermotif Peptides

HPV33	E1	11	247	HPV33	E1	8	549
HPV33	E1	10	483	HPV33	E1	9	549
HPV33	E1	11	271	HPV33	E1	8	437
HPV33	E1	9	47	HPV33	E1	10	437
HPV33	E1	9	438	HPV33	E1	8	308
HPV33	E1	9	290	HPV33	E1	11	146
HPV33	E1	11	290	HPV33	E1	8	355
HPV33	E1	8	286	HPV33	E1	9	273
HPV33	E1	8	260	HPV33	E1	8	280
HPV33	E1	9	260	HPV33	E1	11	280
HPV33	E1	10	260	HPV33	E1	11	575
HPV33	E1	11	260	HPV33	E1	9	335
HPV33	E1	9	362	HPV33	E1	8	608
HPV33	E1	10	362	HPV33	E1	9	608
HPV33	E1	11	362	HPV33	E1	9	568
HPV33	E1	10	281	HPV33	E1	10	440
HPV33	E1	11	281	HPV33	E1	11	440
HPV33	E1	10	576	HPV33	E1	10	604
HPV33	E1	8	336	HPV33	E1	9	211
HPV33	E1	9	547	HPV33	E1	9	342
HPV33	E1	10	547	HPV33	E1	9	539
HPV33	E1	11	547	HPV33	E1	10	111
HPV33	E1	8	201	HPV33	E1	9	292
HPV33	E1	10	201	HPV33	E1	11	482
HPV33	E1	8	253	HPV33	E1	11	243
HPV33	E1	8	312	HPV33	E1	9	252
HPV33	E1	11	312	HPV33	E1	9	239
HPV33	E1	8	513	HPV33	E1	10	239
HPV33	E1	10	513	HPV33	E1	8	521
HPV33	E1	8	298	HPV33	E1	9	521
HPV33	E1	10	353	HPV33	E1	8	477
HPV33	E1	8	443	HPV33	E1	10	477
HPV33	E1	11	443	HPV33	E1	11	477
HPV33	E1	8	346	HPV33	E1	9	183
HPV33	E1	11	346	HPV33	E1	9	328
HPV33	E1	10	199	HPV33	E1	9	282
HPV33	E1	9	71	HPV33	E1	10	282
HPV33	E1	10	289	HPV33	E1	9	577
HPV33	E1	9	135	HPV33	E1	11	577
HPV33	E1	9	473	HPV33	E1	11	337
HPV33	E1	11	473	HPV33	E1	8	609
HPV33	E1	8	195	HPV33	E1	11	523
HPV33	E1	10	195	HPV33	E1	10	119
HPV33	E1	10	560	HPV33	E1	8	578
HPV33	E1	10	175	HPV33	E1	10	578
HPV33	E1	11	181	HPV33	E1	10	23
HPV33	E1	10	601	HPV33	E1	11	491
HPV33	E1	8	431	HPV33	E1	11	190
HPV33	E1	9	431	HPV33	E1	8	246
HPV33	E1	11	431	HPV33	E1	9	246
HPV33	E1	10	586	HPV33	E1	10	338
HPV33	E1	10	519	HPV33	E1	11	338
HPV33	E1	11	519	HPV33	E1	10	182
HPV33	E1	8	434	HPV33	E1	8	517
HPV33	E1	11	434	HPV33	E1	9	517
HPV33	E1	9	505	HPV33	E1	9	594
HPV33	E1	10	505	HPV33	E1	8	17
HPV33	E1	10	593	HPV33	E1	9	314
HPV33	E1	10	570	HPV33	E1	8	332
HPV33	E1	8	485	HPV33	E1	10	502

Table X
HLA A24 Supermotif Peptides

HPV33	E1	8	522	HPV33	E2	8	35
HPV33	E1	9	478	HPV33	E2	9	35
HPV33	E1	10	478	HPV33	E2	10	35
HPV33	E1	10	524	HPV33	E2	9	62
HPV33	E1	9	571	HPV33	E2	8	42
HPV33	E1	11	571	HPV33	E2	10	42
HPV33	E1	11	528	HPV33	E2	11	240
HPV33	E1	10	313	HPV33	E2	9	18
HPV33	E2	9	69	HPV33	E2	9	299
HPV33	E2	11	69	HPV33	E2	11	299
HPV33	E2	10	78	HPV33	E2	9	43
HPV33	E2	9	41	HPV33	E2	8	333
HPV33	E2	11	41	HPV33	E2	8	147
HPV33	E2	9	10	HPV33	E2	9	147
HPV33	E2	10	10	HPV33	E2	11	147
HPV33	E2	9	288	HPV33	E2	11	183
HPV33	E2	10	145	HPV33	E2	11	157
HPV33	E2	11	145	HPV33	E2	8	127
HPV33	E2	9	25	HPV33	E2	11	127
HPV33	E2	11	25	HPV33	E2	8	272
HPV33	E2	10	17	HPV33	E2	8	133
HPV33	E2	9	235	HPV33	E2	9	196
HPV33	E2	10	235	HPV33	E2	9	342
HPV33	E2	9	232	HPV33	E2	10	342
HPV33	E2	8	153	HPV33	E2	9	295
HPV33	E2	8	130	HPV33	E2	8	29
HPV33	E2	9	130	HPV33	E2	10	29
HPV33	E2	10	130	HPV33	E2	9	345
HPV33	E2	11	130	HPV33	E2	10	203
HPV33	E2	9	74	HPV33	E2	9	332
HPV33	E2	10	298	HPV33	E2	8	96
HPV33	E2	8	80	HPV33	E2	9	71
HPV33	E2	9	185	HPV33	E2	9	191
HPV33	E2	11	100	HPV33	E2	9	91
HPV33	E2	9	325	HPV33	E2	10	120
HPV33	E2	10	325	HPV33	E2	9	86
HPV33	E2	11	325	HPV33	E2	8	292
HPV33	E2	11	336	HPV33	E2	9	292
HPV33	E2	10	53	HPV33	E2	9	7
HPV33	E2	11	53	HPV33	E2	10	7
HPV33	E2	9	278	HPV33	E2	8	37
HPV33	E2	11	32	HPV33	E2	11	266
HPV33	E2	9	139	HPV33	E2	10	290
HPV33	E2	11	276	HPV33	E2	11	290
HPV33	E2	11	137	HPV33	E2	9	285
HPV33	E2	8	339	HPV33	E2	10	61
HPV33	E2	9	242	HPV33	E2	8	302
HPV33	E2	9	34	HPV33	E2	8	205
HPV33	E2	11	34	HPV33	E2	10	324
HPV33	E2	8	23	HPV33	E2	11	324
HPV33	E2	11	23	HPV33	E2	10	93
HPV33	E2	8	66	HPV33	E2	11	93
HPV33	E2	10	66	HPV33	E2	10	128
HPV33	E2	8	151	HPV33	E2	11	128
HPV33	E2	9	151	HPV33	E2	9	146
HPV33	E2	10	151	HPV33	E2	10	146
HPV33	E2	10	169	HPV33	E2	8	233
HPV33	E2	8	177	HPV33	E2	11	233
HPV33	E2	8	243	HPV33	E2	10	267
				HPV33	E2	10	337

Table X
HLA A24 Supermotif Peptides

HPV33	E2	8	343	HPV33	E5	9	5
HPV33	E2	9	343	HPV33	E5	11	5
HPV33	E2	11	343	HPV33	E5	8	49
HPV33	E2	8	72	HPV33	E5	9	49
HPV33	E2	11	72	HPV33	E5	10	49
HPV33	E2	8	192	HPV33	E5	11	49
HPV33	E2	8	326	HPV33	E5	8	2
HPV33	E2	9	326	HPV33	E5	9	2
HPV33	E2	10	326	HPV33	E5	10	2
HPV33	E2	11	323	HPV33	E5	11	2
HPV33	E2	8	148	HPV33	E5	8	10
HPV33	E2	10	148	HPV33	E5	9	10
HPV33	E2	11	148	HPV33	E5	10	10
HPV33	E2	10	101	HPV33	E5	9	23
HPV33	E2	9	102	HPV33	E5	10	23
HPV33	E2	8	92	HPV33	E5	11	23
HPV33	E2	11	92	HPV33	E5	8	48
HPV33	E2	9	170	HPV33	E5	9	48
HPV33	E2	9	159	HPV33	E5	10	48
HPV33	E2	10	159	HPV33	E5	11	48
HPV33	E2	10	138	HPV33	E5	8	11
HPV33	E2	8	44	HPV33	E5	9	11
HPV33	E2	11	44	HPV33	E5	8	55
HPV33	E2	8	131	HPV33	E5	10	55
HPV33	E2	9	131	HPV33	E5	8	22
HPV33	E2	10	131	HPV33	E5	10	22
HPV33	E2	10	158	HPV33	E5	11	22
HPV33	E2	11	158	HPV33	E5	8	54
HPV33	E5	8	30	HPV33	E5	9	54
HPV33	E5	9	30	HPV33	E5	11	54
HPV33	E5	10	30	HPV33	E5	8	17
HPV33	E5	11	30	HPV33	E5	10	17
HPV33	E5	8	8	HPV33	E5	11	37
HPV33	E5	10	8	HPV33	E5	9	18
HPV33	E5	11	8	HPV33	E5	8	32
HPV33	E5	9	63	HPV33	E5	9	32
HPV33	E5	9	14	HPV33	E5	11	32
HPV33	E5	10	14	HPV33	E5	10	38
HPV33	E5	11	14	HPV33	E5	8	35
HPV33	E5	8	52	HPV33	E5	8	33
HPV33	E5	10	52	HPV33	E5	10	33
HPV33	E5	11	52	HPV33	E5	9	39
HPV33	E5	8	50	HPV33	E5	11	39
HPV33	E5	9	50	HPV33	E5	8	57
HPV33	E5	10	50	HPV33	E5	10	57
HPV33	E5	9	9	HPV33	E5	9	1
HPV33	E5	10	9	HPV33	E5	10	1
HPV33	E5	11	9	HPV33	E5	11	1
HPV33	E5	8	12	HPV33	E5	11	61
HPV33	E5	11	12	HPV33	E5	9	21
HPV33	E5	9	56	HPV33	E5	11	21
HPV33	E5	11	56	HPV33	E5	8	46
HPV33	E5	8	3	HPV33	E5	9	46
HPV33	E5	9	3	HPV33	E5	10	46
HPV33	E5	10	3	HPV33	E5	11	46
HPV33	E5	11	3	HPV33	E5	8	25
HPV33	E5	8	42	HPV33	E5	9	25
HPV33	E5	9	42	HPV33	E5	11	25
HPV33	E5	10	42	HPV33	E5	8	16
HPV33	E5	8	5	HPV33	E5	9	16

Table X
HLA A24 Supermotif Peptides

HPV33	E5	11	16	HPV33	E6	10	36
HPV33	E5	9	27	HPV33	E6	10	90
HPV33	E5	11	27	HPV33	E6	11	90
HPV33	E5	8	28	HPV33	E6	9	124
HPV33	E5	10	28	HPV33	E6	9	68
HPV33	E5	11	28	HPV33	E6	10	10
HPV33	E5	9	41	HPV33	E6	10	131
HPV33	E5	10	41	HPV33	E6	10	87
HPV33	E5	11	41	HPV33	E6	9	11
HPV33	E5	8	4	HPV33	E6	8	21
HPV33	E5	9	4	HPV33	E6	9	91
HPV33	E5	10	4	HPV33	E6	10	91
HPV33	E5	8	6	HPV33	E6	11	91
HPV33	E5	10	6	HPV33	E6	10	51
HPV33	E5	9	34	HPV33	E6	9	52
HPV33	E5	8	31	HPV33	E6	11	52
HPV33	E5	9	31	HPV33	E6	9	42
HPV33	E5	10	31	HPV33	E6	8	53
HPV33	E5	8	40	HPV33	E6	10	53
HPV33	E5	10	40	HPV33	E7	9	68
HPV33	E5	11	40	HPV33	E7	8	75
HPV33	E5	9	53	HPV33	E7	9	75
HPV33	E5	10	53	HPV33	E7	10	75
HPV33	E5	9	58	HPV33	E7	8	21
HPV33	E6	9	46	HPV33	E7	9	14
HPV33	E6	9	18	HPV33	E7	10	14
HPV33	E6	11	18	HPV33	E7	9	59
HPV33	E6	8	103	HPV33	E7	8	82
HPV33	E6	8	66	HPV33	E7	8	15
HPV33	E6	11	66	HPV33	E7	9	15
HPV33	E6	8	30	HPV33	E7	11	15
HPV33	E6	11	139	HPV33	E7	10	19
HPV33	E6	10	14	HPV33	E7	8	6
HPV33	E6	9	120	HPV33	E7	10	6
HPV33	E6	9	4	HPV33	E7	11	6
HPV33	E6	8	98	HPV33	E7	9	81
HPV33	E6	11	27	HPV33	E7	11	66
HPV33	E6	9	20	HPV33	E7	8	77
HPV33	E6	10	41	HPV33	E7	9	71
HPV33	E6	10	75	HPV33	E7	9	7
HPV33	E6	8	69	HPV33	E7	10	7
HPV33	E6	11	69	HPV33	E7	11	12
HPV33	E6	9	61	HPV33	L1	10	290
HPV33	E6	10	61	HPV33	L1	10	392
HPV33	E6	8	118	HPV33	L1	9	44
HPV33	E6	11	118	HPV33	L1	8	270
HPV33	E6	11	78	HPV33	L1	11	147
HPV33	E6	8	72	HPV33	L1	10	345
HPV33	E6	10	72	HPV33	L1	9	223
HPV33	E6	10	64	HPV33	L1	8	396
HPV33	E6	11	100	HPV33	L1	10	396
HPV33	E6	11	50	HPV33	L1	11	457
HPV33	E6	11	86	HPV33	L1	10	449
HPV33	E6	9	80	HPV33	L1	8	370
HPV33	E6	9	59	HPV33	L1	10	199
HPV33	E6	11	59	HPV33	L1	8	129
HPV33	E6	10	95	HPV33	L1	9	202
HPV33	E6	11	95	HPV33	L1	8	335
HPV33	E6	8	36	HPV33	L1	10	335
				HPV33	L1	11	415

Table X
HLA A24 Supermotif Peptides

HPV33 L1	9	151	HPV33 L1	8	306
HPV33 L1	10	151	HPV33 L1	11	190
HPV33 L1	10	233	HPV33 L1	8	42
HPV33 L1	8	107	HPV33 L1	9	42
HPV33 L1	8	447	HPV33 L1	11	42
HPV33 L1	9	385	HPV33 L1	9	61
HPV33 L1	8	368	HPV33 L1	11	61
HPV33 L1	10	368	HPV33 L1	8	382
HPV33 L1	9	361	HPV33 L1	9	382
HPV33 L1	11	361	HPV33 L1	9	405
HPV33 L1	8	26	HPV33 L1	8	62
HPV33 L1	9	26	HPV33 L1	10	62
HPV33 L1	10	26	HPV33 L1	8	99
HPV33 L1	11	26	HPV33 L1	10	99
HPV33 L1	9	247	HPV33 L1	10	237
HPV33 L1	10	247	HPV33 L1	11	237
HPV33 L1	8	248	HPV33 L1	11	387
HPV33 L1	9	248	HPV33 L1	9	200
HPV33 L1	8	260	HPV33 L1	11	200
HPV33 L1	9	291	HPV33 L1	8	299
HPV33 L1	8	249	HPV33 L1	9	299
HPV33 L1	10	373	HPV33 L1	9	192
HPV33 L1	10	445	HPV33 L1	11	221
HPV33 L1	9	91	HPV33 L1	8	187
HPV33 L1	11	91	HPV33 L1	9	187
HPV33 L1	10	204	HPV33 L1	8	439
HPV33 L1	8	85	HPV33 L1	8	462
HPV33 L1	9	322	HPV33 L1	11	113
HPV33 L1	8	117	HPV33 L1	8	55
HPV33 L1	11	117	HPV33 L1	11	17
HPV33 L1	10	105	HPV33 L1	8	241
HPV33 L1	8	472	HPV33 L1	9	241
HPV33 L1	11	68	HPV33 L1	10	241
HPV33 L1	10	404	HPV33 L1	8	460
HPV33 L1	11	265	HPV33 L1	9	460
HPV33 L1	11	281	HPV33 L1	10	460
HPV33 L1	9	115	HPV33 L1	11	372
HPV33 L1	10	115	HPV33 L1	8	305
HPV33 L1	9	259	HPV33 L1	9	305
HPV33 L1	9	365	HPV33 L1	8	254
HPV33 L1	11	365	HPV33 L1	8	347
HPV33 L1	9	397	HPV33 L1	9	70
HPV33 L1	10	33	HPV33 L1	8	418
HPV33 L1	11	33	HPV33 L1	9	41
HPV33 L1	11	126	HPV33 L1	10	41
HPV33 L1	9	83	HPV33 L1	8	77
HPV33 L1	10	83	HPV33 L1	10	77
HPV33 L1	8	466	HPV33 L1	9	98
HPV33 L1	9	453	HPV33 L1	11	98
HPV33 L1	11	453	HPV33 L1	10	75
HPV33 L1	10	60	HPV33 L1	10	90
HPV33 L1	11	236	HPV33 L1	11	51
HPV33 L1	10	65	HPV33 L1	8	285
HPV33 L1	9	379	HPV33 L1	11	32
HPV33 L1	11	379	HPV33 L1	11	245
HPV33 L1	8	20	HPV33 L1	8	412
HPV33 L1	8	230	HPV33 L1	9	149
HPV33 L1	9	442	HPV33 L1	11	149
HPV33 L1	10	246	HPV33 L1	9	298
HPV33 L1	11	246	HPV33 L1	10	298

Table X
HLA A24 Supermotif Peptides

HPV33	L1	8	227		HPV33	L2	10	283
HPV33	L1	9	227		HPV33	L2	10	272
HPV33	L1	11	227		HPV33	L2	11	272
HPV33	L1	11	23		HPV33	L2	8	327
HPV33	L1	8	352		HPV33	L2	10	431
HPV33	L1	11	352		HPV33	L2	10	264
HPV33	L1	11	2		HPV33	L2	10	401
HPV33	L1	11	444		HPV33	L2	9	350
HPV33	L1	8	193		HPV33	L2	10	95
HPV33	L1	10	266		HPV33	L2	9	369
HPV33	L1	11	266		HPV33	L2	11	30
HPV33	L1	11	212		HPV33	L2	11	113
HPV33	L1	9	381		HPV33	L2	10	447
HPV33	L1	10	381		HPV33	L2	8	242
HPV33	L1	10	282		HPV33	L2	9	242
HPV33	L1	11	282		HPV33	L2	11	242
HPV33	L1	9	336		HPV33	L2	8	440
HPV33	L1	11	430		HPV33	L2	9	440
HPV33	L1	11	332		HPV33	L2	10	440
HPV33	L1	10	388		HPV33	L2	8	421
HPV33	L1	11	388		HPV33	L2	10	421
HPV33	L1	10	353		HPV33	L2	8	25
HPV33	L1	11	353		HPV33	L2	9	75
HPV33	L1	10	416		HPV33	L2	11	75
HPV33	L1	9	374		HPV33	L2	9	51
HPV33	L1	8	386		HPV33	L2	8	374
HPV33	L1	8	380		HPV33	L2	11	374
HPV33	L1	10	380		HPV33	L2	8	336
HPV33	L1	11	380		HPV33	L2	10	336
HPV33	L1	8	300		HPV33	L2	9	323
HPV33	L1	10	333		HPV33	L2	9	284
HPV33	L1	9	100		HPV33	L2	10	44
HPV33	L1	10	3		HPV33	L2	11	44
HPV33	L1	11	3		HPV33	L2	9	448
HPV33	L1	9	389		HPV33	L2	11	448
HPV33	L1	10	389		HPV33	L2	10	292
HPV33	L1	11	276		HPV33	L2	8	250
HPV33	L1	8	362		HPV33	L2	11	250
HPV33	L1	10	362		HPV33	L2	10	104
HPV33	L1	9	234		HPV33	L2	11	104
HPV33	L1	8	443		HPV33	L2	8	433
HPV33	L1	8	27		HPV33	L2	10	433
HPV33	L1	9	27		HPV33	L2	10	248
HPV33	L1	10	27		HPV33	L2	8	311
HPV33	L1	8	35		HPV33	L2	11	34
HPV33	L1	9	35		HPV33	L2	8	236
HPV33	L1	9	34		HPV33	L2	8	46
HPV33	L1	10	34		HPV33	L2	9	46
HPV33	L2	11	256		HPV33	L2	8	414
HPV33	L2	9	241		HPV33	L2	11	414
HPV33	L2	10	241		HPV33	L2	8	107
HPV33	L2	11	291		HPV33	L2	9	249
HPV33	L2	10	23		HPV33	L2	8	243
HPV33	L2	11	308		HPV33	L2	10	243
HPV33	L2	10	385		HPV33	L2	9	397
HPV33	L2	8	280		HPV33	L2	10	372
HPV33	L2	8	439		HPV33	L2	10	391
HPV33	L2	9	439		HPV33	L2	10	143
HPV33	L2	10	439		HPV33	L2	8	209
HPV33	L2	11	439		HPV33	L2	8	426

Table X

HLA A24 Supermotif Peptides

HPV33	L2	8	420	HPV33	L2	10	309
HPV33	L2	9	420	HPV33	L2	9	265
HPV33	L2	11	420	HPV33	L2	9	386
HPV33	L2	11	73	HPV33	L2	11	386
HPV33	L2	11	215	HPV33	L2	10	132
HPV33	L2	8	423	HPV33	L2	11	132
HPV33	L2	11	423	HPV33	L2	8	93
HPV33	L2	11	333	HPV33	L2	9	96
HPV33	L2	9	99	HPV33	L2	9	337
HPV33	L2	10	99	HPV33	L2	10	187
HPV33	L2	9	413	HPV33	L2	10	251
HPV33	L2	10	347	HPV33	L2	8	52
HPV33	L2	11	395	HPV33	L2	10	31
HPV33	L2	9	376	HPV33	L2	8	441
HPV33	L2	10	79	HPV33	L2	9	441
HPV33	L2	9	161	HPV33	L2	11	404
HPV33	L2	9	416	HPV33	L2	11	131
HPV33	L2	8	186	HPV33	L2	9	92
HPV33	L2	11	186	HPV33	L2	9	434
HPV33	L2	8	221	HPV33	L2	11	446
HPV33	L2	8	403	HPV33	L2	8	324
HPV33	L2	10	91	HPV33	L2	11	324
HPV33	L2	8	317	HPV45	E1	11	384
HPV33	L2	9	317	HPV45	E1	9	532
HPV33	L2	8	43	HPV45	E1	9	311
HPV33	L2	11	43	HPV45	E1	9	199
HPV33	L2	11	153	HPV45	E1	10	199
HPV33	L2	9	234	HPV45	E1	11	512
HPV33	L2	10	234	HPV45	E1	8	40
HPV33	L2	11	300	HPV45	E1	11	40
HPV33	L2	8	321	HPV45	E1	8	517
HPV33	L2	11	321	HPV45	E1	9	517
HPV33	L2	9	388	HPV45	E1	10	251
HPV33	L2	8	303	HPV45	E1	9	202
HPV33	L2	8	259	HPV45	E1	11	202
HPV33	L2	10	259	HPV45	E1	10	604
HPV33	L2	10	357	HPV45	E1	9	259
HPV33	L2	8	393	HPV45	E1	10	259
HPV33	L2	8	122	HPV45	E1	11	259
HPV33	L2	9	151	HPV45	E1	9	297
HPV33	L2	11	103	HPV45	E1	8	226
HPV33	L2	9	49	HPV45	E1	9	226
HPV33	L2	11	49	HPV45	E1	10	634
HPV33	L2	8	106	HPV45	E1	8	521
HPV33	L2	9	106	HPV45	E1	9	521
HPV33	L2	8	156	HPV45	E1	9	49
HPV33	L2	8	38	HPV45	E1	10	206
HPV33	L2	10	38	HPV45	E1	8	349
HPV33	L2	8	189	HPV45	E1	10	349
HPV33	L2	10	189	HPV45	E1	9	108
HPV33	L2	11	352	HPV45	E1	11	108
HPV33	L2	10	146	HPV45	E1	8	361
HPV33	L2	10	192	HPV45	E1	10	361
HPV33	L2	8	355	HPV45	E1	9	367
HPV33	L2	9	355	HPV45	E1	10	46
HPV33	L2	8	162	HPV45	E1	11	352
HPV33	L2	9	39	HPV45	E1	8	106
HPV33	L2	10	154	HPV45	E1	11	106
HPV33	L2	9	432	HPV45	E1	10	623
HPV33	L2	11	432	HPV45	E1	9	42

Table X
HLA A24 Supermotif Peptides

HPV45 E1	10	42		HPV45 E1	9	292
HPV45 E1	9	328		HPV45 E1	10	404
HPV45 E1	11	328		HPV45 E1	11	338
HPV45 E1	8	431		HPV45 E1	11	491
HPV45 E1	9	431		HPV45 E1	8	184
HPV45 E1	11	431		HPV45 E1	10	23
HPV45 E1	9	445		HPV45 E1	9	207
HPV45 E1	10	596		HPV45 E1	8	425
HPV45 E1	11	596		HPV45 E1	11	425
HPV45 E1	10	38		HPV45 E1	9	304
HPV45 E1	11	295		HPV45 E1	10	304
HPV45 E1	9	74		HPV45 E1	11	304
HPV45 E1	11	74		HPV45 E1	9	245
HPV45 E1	10	324		HPV45 E1	10	245
HPV45 E1	9	324		HPV45 E1	9	223
HPV45 E1	8	331		HPV45 E1	11	223
HPV45 E1	9	331		HPV45 E1	9	263
HPV45 E1	9	605		HPV45 E1	10	263
HPV45 E1	11	605		HPV45 E1	9	393
HPV45 E1	8	50		HPV45 E1	9	129
HPV45 E1	9	483		HPV45 E1	8	247
HPV45 E1	10	483		HPV45 E1	11	247
HPV45 E1	8	446		HPV45 E1	8	267
HPV45 E1	11	446		HPV45 E1	9	290
HPV45 E1	11	456		HPV45 E1	10	290
HPV45 E1	10	385		HPV45 E1	11	290
HPV45 E1	11	385		HPV45 E1	11	190
HPV45 E1	9	486		HPV45 E1	9	547
HPV45 E1	8	449		HPV45 E1	10	547
HPV45 E1	9	449		HPV45 E1	11	547
HPV45 E1	9	438		HPV45 E1	11	271
HPV45 E1	10	438		HPV45 E1	9	362
HPV45 E1	8	212		HPV45 E1	11	362
HPV45 E1	9	579		HPV45 E1	8	336
HPV45 E1	8	130		HPV45 E1	10	281
HPV45 E1	8	494		HPV45 E1	11	281
HPV45 E1	9	494		HPV45 E1	8	253
HPV45 E1	10	494		HPV45 E1	11	468
HPV45 E1	11	243		HPV45 E1	8	312
HPV45 E1	9	342		HPV45 E1	11	312
HPV45 E1	11	209		HPV45 E1	8	200
HPV45 E1	8	480		HPV45 E1	9	200
HPV45 E1	8	11		HPV45 E1	11	200
HPV45 E1	9	11		HPV45 E1	10	513
HPV45 E1	8	459		HPV45 E1	8	298
HPV45 E1	9	459		HPV45 E1	9	47
HPV45 E1	10	459		HPV45 E1	11	47
HPV45 E1	11	459		HPV45 E1	10	353
HPV45 E1	8	443		HPV45 E1	10	347
HPV45 E1	11	443		HPV45 E1	10	560
HPV45 E1	8	265		HPV45 E1	8	414
HPV45 E1	10	265		HPV45 E1	9	473
HPV45 E1	10	235		HPV45 E1	11	473
HPV45 E1	8	16		HPV45 E1	8	177
HPV45 E1	8	485		HPV45 E1	11	177
HPV45 E1	10	485		HPV45 E1	10	601
HPV45 E1	9	256		HPV45 E1	10	586
HPV45 E1	10	519		HPV45 E1	8	554
HPV45 E1	11	519		HPV45 E1	11	537
HPV45 E1	8	292		HPV45 E1	8	434

Table X
HLA A24 Supermotif Peptides

HPV45	E1	9	505	HPV45	E1	9	577
HPV45	E1	10	505	HPV45	E1	11	577
HPV45	E1	10	546	HPV45	E1	11	523
HPV45	E1	11	546	HPV45	E1	8	203
HPV45	E1	10	238	HPV45	E1	10	203
HPV45	E1	11	238	HPV45	E1	8	578
HPV45	E1	10	593	HPV45	E1	10	578
HPV45	E1	10	570	HPV45	E1	9	81
HPV45	E1	10	437	HPV45	E1	9	266
HPV45	E1	11	437	HPV45	E1	9	635
HPV45	E1	8	549	HPV45	E1	10	576
HPV45	E1	9	549	HPV45	E1	9	594
HPV45	E1	8	102	HPV45	E1	9	418
HPV45	E1	8	412	HPV45	E1	8	332
HPV45	E1	10	412	HPV45	E1	8	522
HPV45	E1	10	80	HPV45	E1	9	314
HPV45	E1	8	355	HPV45	E1	10	524
HPV45	E1	10	417	HPV45	E1	9	478
HPV45	E1	10	128	HPV45	E1	10	478
HPV45	E1	9	335	HPV45	E1	9	571
HPV45	E1	8	280	HPV45	E1	11	571
HPV45	E1	11	280	HPV45	E1	8	394
HPV45	E1	8	608	HPV45	E1	11	528
HPV45	E1	11	575	HPV45	E1	10	313
HPV45	E1	9	273	HPV45	E2	8	78
HPV45	E1	8	440	HPV45	E2	11	78
HPV45	E1	10	440	HPV45	E2	11	47
HPV45	E1	11	440	HPV45	E2	10	84
HPV45	E1	10	482	HPV45	E2	10	16
HPV45	E1	11	482	HPV45	E2	10	247
HPV45	E1	9	448	HPV45	E2	8	216
HPV45	E1	10	448	HPV45	E2	9	305
HPV45	E1	9	211	HPV45	E2	10	134
HPV45	E1	9	493	HPV45	E2	11	134
HPV45	E1	10	493	HPV45	E2	8	158
HPV45	E1	11	493	HPV45	E2	9	158
HPV45	E1	9	539	HPV45	E2	10	158
HPV45	E1	10	539	HPV45	E2	8	31
HPV45	E1	8	183	HPV45	E2	9	31
HPV45	E1	9	183	HPV45	E2	11	31
HPV45	E1	11	288	HPV45	E2	8	171
HPV45	E1	8	308	HPV45	E2	8	212
HPV45	E1	10	104	HPV45	E2	11	351
HPV45	E1	8	477	HPV45	E2	8	319
HPV45	E1	10	477	HPV45	E2	9	80
HPV45	E1	11	477	HPV45	E2	11	106
HPV45	E1	8	580	HPV45	E2	8	343
HPV45	E1	11	22	HPV45	E2	9	192
HPV45	E1	8	246	HPV45	E2	11	97
HPV45	E1	9	246	HPV45	E2	8	50
HPV45	E1	10	289	HPV45	E2	11	50
HPV45	E1	11	289	HPV45	E2	9	295
HPV45	E1	9	252	HPV45	E2	11	325
HPV45	E1	8	224	HPV45	E2	9	24
HPV45	E1	10	224	HPV45	E2	9	316
HPV45	E1	11	224	HPV45	E2	11	316
HPV45	E1	9	239	HPV45	E2	11	293
HPV45	E1	10	239	HPV45	E2	10	48
HPV45	E1	9	282	HPV45	E2	11	151
HPV45	E1	10	282	HPV45	E2	9	143

Table X
HLA A24 Supermotif Peptides

HPV45	E2	10	143	HPV45	E2	8	199
HPV45	E2	10	59	HPV45	E2	9	353
HPV45	E2	9	2	HPV45	E2	10	352
HPV45	E2	8	154	HPV45	E2	8	138
HPV45	E2	9	154	HPV45	E2	9	138
HPV45	E2	10	284	HPV45	E2	8	139
HPV45	E2	11	284	HPV45	E2	11	125
HPV45	E2	9	312	HPV45	E2	11	164
HPV45	E2	8	184	HPV45	E2	10	326
HPV45	E2	9	92	HPV45	E2	11	326
HPV45	E2	9	49	HPV45	E2	10	98
HPV45	E2	8	41	HPV45	E2	11	98
HPV45	E2	9	41	HPV45	E2	10	126
HPV45	E2	10	41	HPV45	E2	9	166
HPV45	E2	10	107	HPV45	E2	10	166
HPV45	E2	11	69	HPV45	E2	8	145
HPV45	E2	8	109	HPV45	E2	11	175
HPV45	E2	9	347	HPV45	E2	8	137
HPV45	E2	9	332	HPV45	E2	9	137
HPV45	E2	8	265	HPV45	E2	10	137
HPV45	E2	9	265	HPV45	E2	11	38
HPV45	E2	8	289	HPV45	E2	10	165
HPV45	E2	9	198	HPV45	E2	11	165
HPV45	E2	8	136	HPV45	E2	8	144
HPV45	E2	9	136	HPV45	E2	9	144
HPV45	E2	10	136	HPV45	E6	9	48
HPV45	E2	11	136	HPV45	E6	9	37
HPV45	E2	9	177	HPV45	E6	11	37
HPV45	E2	9	360	HPV45	E6	9	61
HPV45	E2	8	35	HPV45	E6	11	61
HPV45	E2	10	35	HPV45	E6	11	59
HPV45	E2	9	40	HPV45	E6	8	68
HPV45	E2	10	40	HPV45	E6	11	68
HPV45	E2	11	40	HPV45	E6	8	105
HPV45	E2	11	4	HPV45	E6	8	18
HPV45	E2	8	63	HPV45	E6	8	32
HPV45	E2	8	43	HPV45	E6	9	70
HPV45	E2	9	309	HPV45	E6	11	70
HPV45	E2	9	13	HPV45	E6	10	16
HPV45	E2	10	13	HPV45	E6	10	51
HPV45	E2	10	263	HPV45	E6	8	27
HPV45	E2	11	263	HPV45	E6	11	20
HPV45	E2	11	307	HPV45	E6	10	77
HPV45	E2	10	142	HPV45	E6	10	97
HPV45	E2	11	142	HPV45	E6	11	88
HPV45	E2	9	302	HPV45	E6	10	43
HPV45	E2	9	9	HPV45	E6	11	43
HPV45	E2	9	235	HPV45	E6	8	53
HPV45	E2	8	358	HPV45	E6	10	53
HPV45	E2	9	358	HPV45	E6	8	71
HPV45	E2	11	358	HPV45	E6	10	71
HPV45	E2	8	160	HPV45	E6	11	71
HPV45	E2	8	37	HPV45	E6	8	120
HPV45	E2	8	348	HPV45	E6	11	120
HPV45	E2	8	354	HPV45	E6	9	93
HPV45	E2	9	99	HPV45	E6	10	93
HPV45	E2	10	99	HPV45	E6	11	93
HPV45	E2	11	213	HPV45	E6	9	54
HPV45	E2	11	190	HPV45	E6	8	92
HPV45	E2	11	339	HPV45	E6	10	92

Table X
HLA A24 Supermotif Peptides

HPV45	E6	11	92	HPV45	L1	8	103
HPV45	E6	9	13	HPV45	L1	10	103
HPV45	E6	9	52	HPV45	L1	11	28
HPV45	E6	11	52	HPV45	L1	8	88
HPV45	E6	11	102	HPV45	L1	10	88
HPV45	E6	9	98	HPV45	L1	11	94
HPV45	E6	8	95	HPV45	L1	9	184
HPV45	E6	9	95	HPV45	L1	8	276
HPV45	E6	9	22	HPV45	L1	10	409
HPV45	E6	11	111	HPV45	L1	9	188
HPV45	E6	8	7	HPV45	L1	11	318
HPV45	E6	11	7	HPV45	L1	9	250
HPV45	E6	11	11	HPV45	L1	11	488
HPV45	E6	8	46	HPV45	L1	10	480
HPV45	E6	9	46	HPV45	L1	8	401
HPV45	E6	11	46	HPV45	L1	11	401
HPV45	E6	10	3	HPV45	L1	11	301
HPV45	E6	9	126	HPV45	L1	10	226
HPV45	E6	8	74	HPV45	L1	9	229
HPV45	E6	9	41	HPV45	L1	8	242
HPV45	E6	8	79	HPV45	L1	10	242
HPV45	E6	11	29	HPV45	L1	11	461
HPV45	E6	11	24	HPV45	L1	8	364
HPV45	E6	10	84	HPV45	L1	10	364
HPV45	E6	10	89	HPV45	L1	8	296
HPV45	E6	11	89	HPV45	L1	9	296
HPV45	E6	8	38	HPV45	L1	10	169
HPV45	E6	10	38	HPV45	L1	9	177
HPV45	E6	9	85	HPV45	L1	10	177
HPV45	E6	9	44	HPV45	L1	10	260
HPV45	E6	10	44	HPV45	L1	8	52
HPV45	E6	11	44	HPV45	L1	9	52
HPV45	E6	8	55	HPV45	L1	10	52
HPV45	E6	11	80	HPV45	L1	8	133
HPV45	E7	8	6	HPV45	L1	10	133
HPV45	E7	10	6	HPV45	L1	8	313
HPV45	E7	10	64	HPV45	L1	9	416
HPV45	E7	8	25	HPV45	L1	10	246
HPV45	E7	8	83	HPV45	L1	8	399
HPV45	E7	9	83	HPV45	L1	10	399
HPV45	E7	10	83	HPV45	L1	9	274
HPV45	E7	8	20	HPV45	L1	10	274
HPV45	E7	10	20	HPV45	L1	8	404
HPV45	E7	11	74	HPV45	L1	10	404
HPV45	E7	11	91	HPV45	L1	8	14
HPV45	E7	8	14	HPV45	L1	10	14
HPV45	E7	11	11	HPV45	L1	11	14
HPV45	E7	8	90	HPV45	L1	8	287
HPV45	E7	10	75	HPV45	L1	10	476
HPV45	E7	10	23	HPV45	L1	9	60
HPV45	E7	9	89	HPV45	L1	10	60
HPV45	E7	8	85	HPV45	L1	8	351
HPV45	E7	11	85	HPV45	L1	9	351
HPV45	E7	9	93	HPV45	L1	9	141
HPV45	E7	9	7	HPV45	L1	10	141
HPV45	E7	10	86	HPV45	L1	8	111
HPV45	E7	8	94	HPV45	L1	8	503
HPV45	E7	9	76	HPV45	L1	8	143
HPV45	E7	10	12	HPV45	L1	11	143
HPV45	L1	11	191	HPV45	L1	10	131

Table X
HLA A24 Supermotif Peptides

HPV45 L1	9	199		HPV45 L1	11	4
HPV45 L1	11	292		HPV45 L1	11	310
HPV45 L1	10	435		HPV45 L1	11	49
HPV45 L1	10	231		HPV45 L1	9	219
HPV45 L1	9	286		HPV45 L1	8	383
HPV45 L1	9	396		HPV45 L1	11	383
HPV45 L1	10	396		HPV45 L1	9	19
HPV45 L1	11	396		HPV45 L1	11	19
HPV45 L1	9	392		HPV45 L1	8	17
HPV45 L1	11	392		HPV45 L1	9	17
HPV45 L1	9	13		HPV45 L1	11	17
HPV45 L1	11	13		HPV45 L1	11	173
HPV45 L1	8	23		HPV45 L1	8	22
HPV45 L1	9	405		HPV45 L1	9	22
HPV45 L1	10	59		HPV45 L1	8	248
HPV45 L1	11	59		HPV45 L1	11	248
HPV45 L1	10	12		HPV45 L1	8	214
HPV45 L1	11	11		HPV45 L1	9	214
HPV45 L1	8	5		HPV45 L1	11	139
HPV45 L1	9	5		HPV45 L1	9	440
HPV45 L1	10	5		HPV45 L1	11	440
HPV45 L1	11	5		HPV45 L1	11	380
HPV45 L1	8	185		HPV45 L1	8	470
HPV45 L1	8	411		HPV45 L1	8	268
HPV45 L1	10	411		HPV45 L1	10	268
HPV45 L1	11	411		HPV45 L1	9	403
HPV45 L1	8	328		HPV45 L1	11	403
HPV45 L1	9	328		HPV45 L1	11	182
HPV45 L1	8	6		HPV45 L1	8	281
HPV45 L1	9	6		HPV45 L1	8	334
HPV45 L1	10	6		HPV45 L1	9	334
HPV45 L1	9	117		HPV45 L1	10	206
HPV45 L1	11	117		HPV45 L1	11	263
HPV45 L1	9	109		HPV45 L1	8	491
HPV45 L1	10	109		HPV45 L1	9	491
HPV45 L1	8	497		HPV45 L1	9	96
HPV45 L1	9	484		HPV45 L1	9	67
HPV45 L1	11	484		HPV45 L1	10	67
HPV45 L1	11	475		HPV45 L1	9	124
HPV45 L1	9	473		HPV45 L1	11	124
HPV45 L1	10	91		HPV45 L1	10	101
HPV45 L1	8	257		HPV45 L1	8	46
HPV45 L1	8	335		HPV45 L1	8	254
HPV45 L1	8	68		HPV45 L1	9	254
HPV45 L1	9	68		HPV45 L1	11	254
HPV45 L1	8	413		HPV45 L1	11	58
HPV45 L1	9	413		HPV45 L1	8	427
HPV45 L1	8	69		HPV45 L1	9	327
HPV45 L1	8	125		HPV45 L1	10	327
HPV45 L1	10	125		HPV45 L1	8	443
HPV45 L1	10	29		HPV45 L1	11	272
HPV45 L1	11	29		HPV45 L1	10	423
HPV45 L1	10	302		HPV45 L1	11	115
HPV45 L1	10	273		HPV45 L1	10	376
HPV45 L1	11	273		HPV45 L1	11	43
HPV45 L1	9	227		HPV45 L1	9	175
HPV45 L1	11	227		HPV45 L1	11	175
HPV45 L1	8	4		HPV45 L1	10	419
HPV45 L1	9	4		HPV45 L1	11	419
HPV45 L1	10	4		HPV45 L1	8	220

Table X

HLA A24 Supermotif Peptides

HPV45	L1	9	410		HPV45	L2	8	319
HPV45	L1	11	410		HPV45	L2	9	51
HPV45	L1	10	116		HPV45	L2	8	430
HPV45	L1	8	200		HPV45	L2	9	430
HPV45	L1	11	239		HPV45	L2	10	430
HPV45	L1	9	412		HPV45	L2	8	25
HPV45	L1	10	412		HPV45	L2	10	206
HPV45	L1	10	462		HPV45	L2	10	183
HPV45	L1	9	365		HPV45	L2	9	433
HPV45	L1	8	329		HPV45	L2	10	433
HPV45	L1	8	441		HPV45	L2	11	433
HPV45	L1	10	441		HPV45	L2	8	37
HPV45	L1	8	478		HPV45	L2	9	37
HPV45	L1	8	297		HPV45	L2	11	37
HPV45	L1	11	361		HPV45	L2	8	134
HPV45	L1	10	384		HPV45	L2	10	134
HPV45	L1	8	20		HPV45	L2	8	292
HPV45	L1	10	20		HPV45	L2	10	191
HPV45	L1	11	20		HPV45	L2	9	318
HPV45	L1	10	293		HPV45	L2	8	52
HPV45	L1	11	293		HPV45	L2	9	406
HPV45	L1	8	417		HPV45	L2	10	406
HPV45	L1	10	362		HPV45	L2	9	279
HPV45	L1	9	126		HPV45	L2	8	407
HPV45	L1	10	319		HPV45	L2	9	407
HPV45	L1	9	477		HPV45	L2	9	44
HPV45	L1	9	420		HPV45	L2	10	44
HPV45	L1	10	420		HPV45	L2	11	44
HPV45	L1	9	303		HPV45	L2	10	143
HPV45	L1	9	261		HPV45	L2	8	400
HPV45	L1	8	53		HPV45	L2	9	400
HPV45	L1	9	53		HPV45	L2	8	43
HPV45	L2	8	161		HPV45	L2	10	43
HPV45	L2	11	286		HPV45	L2	11	43
HPV45	L2	10	328		HPV45	L2	11	34
HPV45	L2	11	328		HPV45	L2	8	346
HPV45	L2	11	303		HPV45	L2	10	337
HPV45	L2	8	340		HPV45	L2	11	337
HPV45	L2	11	340		HPV45	L2	10	242
HPV45	L2	9	255		HPV45	L2	11	375
HPV45	L2	11	255		HPV45	L2	9	392
HPV45	L2	8	275		HPV45	L2	10	392
HPV45	L2	10	405		HPV45	L2	9	248
HPV45	L2	11	405		HPV45	L2	8	438
HPV45	L2	10	278		HPV45	L2	9	305
HPV45	L2	11	322		HPV45	L2	8	270
HPV45	L2	11	142		HPV45	L2	10	270
HPV45	L2	9	345		HPV45	L2	11	270
HPV45	L2	11	83		HPV45	L2	10	387
HPV45	L2	11	30		HPV45	L2	8	325
HPV45	L2	10	397		HPV45	L2	10	325
HPV45	L2	11	397		HPV45	L2	8	399
HPV45	L2	8	331		HPV45	L2	9	399
HPV45	L2	8	241		HPV45	L2	10	399
HPV45	L2	11	241		HPV45	L2	8	258
HPV45	L2	9	122		HPV45	L2	11	336
HPV45	L2	11	157		HPV45	L2	10	391
HPV45	L2	8	306		HPV45	L2	11	391
HPV45	L2	8	368		HPV45	L2	9	98
HPV45	L2	10	368		HPV45	L2	9	120

Table X

HLA A24 Supermotif Peptides

HPV45	L2	11	120		HPV45	L2	10	217
HPV45	L2	9	420		HPV45	L2	11	217
HPV45	L2	10	420		HPV45	L2	10	427
HPV45	L2	8	86		HPV45	L2	11	427
HPV45	L2	8	185		HPV45	L2	9	369
HPV45	L2	11	185		HPV45	L2	10	31
HPV45	L2	10	267		HPV45	L2	8	249
HPV45	L2	11	267		HPV45	L2	11	249
HPV45	L2	8	145		HPV45	L2	9	388
HPV45	L2	11	216		HPV45	L2	11	112
HPV45	L2	9	95		HPV45	L2	9	444
HPV45	L2	11	118		HPV45	L2	11	444
HPV45	L2	8	453		HPV45	L2	9	428
HPV45	L2	8	240		HPV45	L2	10	428
HPV45	L2	8	312		HPV45	L2	11	428
HPV45	L2	9	312		HPV45	L2	8	437
HPV45	L2	9	172		HPV45	L2	9	437
HPV45	L2	10	172		HPV45	L2	8	401
HPV45	L2	9	233		HPV45	L2	10	443
HPV45	L2	10	233		HPV45	L2	8	436
HPV45	L2	8	46		HPV45	L2	9	436
HPV45	L2	9	46		HPV45	L2	10	436
HPV45	L2	8	435		HPV45	L2	11	442
HPV45	L2	9	435		HPV56	E2	8	15
HPV45	L2	10	435		HPV56	E2	11	15
HPV45	L2	11	435		HPV56	E2	9	21
HPV45	L2	11	295		HPV56	E2	10	21
HPV45	L2	10	451		HPV56	E2	9	52
HPV45	L2	8	298		HPV56	E2	9	71
HPV45	L2	9	298		HPV56	E2	10	71
HPV45	L2	8	316		HPV56	E2	11	71
HPV45	L2	11	316		HPV56	E2	8	204
HPV45	L2	8	220		HPV56	E2	9	113
HPV45	L2	8	235		HPV56	E2	8	39
HPV45	L2	9	367		HPV56	E2	8	263
HPV45	L2	11	367		HPV56	E2	11	43
HPV45	L2	9	49		HPV56	E2	8	288
HPV45	L2	11	49		HPV56	E2	9	128
HPV45	L2	10	247		HPV56	E2	10	128
HPV45	L2	9	362		HPV56	E2	9	17
HPV45	L2	9	154		HPV56	E2	11	34
HPV45	L2	11	358		HPV56	E2	11	294
HPV45	L2	8	424		HPV56	E2	8	261
HPV45	L2	9	149		HPV56	E2	10	261
HPV45	L2	9	384		HPV56	E2	8	94
HPV45	L2	10	250		HPV56	E2	9	94
HPV45	L2	8	121		HPV56	E2	11	87
HPV45	L2	10	121		HPV56	E2	9	239
HPV45	L2	8	363		HPV56	E2	8	130
HPV45	L2	11	363		HPV56	E2	8	297
HPV45	L2	9	39		HPV56	E2	10	297
HPV45	L2	10	304		HPV56	E2	10	269
HPV45	L2	10	376		HPV56	E2	11	126
HPV45	L2	8	38		HPV56	E2	11	284
HPV45	L2	10	38		HPV56	E2	9	29
HPV45	L2	8	136		HPV56	E2	9	80
HPV45	L2	10	359		HPV56	E2	11	100
HPV45	L2	9	135		HPV56	E2	8	120
HPV45	L2	11	426		HPV56	E2	8	299
HPV45	L2	8	389		HPV56	E2	10	299

Table X
HLA A24 Supermotif Peptides

HPV56 E2	11	258		HPV56 E6	8	50
HPV56 E2	8	233		HPV56 E6	8	33
HPV56 E2	8	90		HPV56 E6	8	106
HPV56 E2	11	90		HPV56 E6	11	60
HPV56 E2	11	78		HPV56 E6	8	28
HPV56 E2	9	260		HPV56 E6	9	83
HPV56 E2	11	260		HPV56 E6	9	23
HPV56 E2	8	46		HPV56 E6	10	52
HPV56 E2	10	44		HPV56 E6	8	39
HPV56 E2	9	216		HPV56 E6	10	39
HPV56 E2	11	149		HPV56 E6	8	20
HPV56 E2	8	277		HPV56 E6	10	20
HPV56 E2	9	277		HPV56 E6	10	44
HPV56 E2	8	152		HPV56 E6	8	72
HPV56 E2	8	301		HPV56 E6	10	72
HPV56 E2	11	19		HPV56 E6	11	72
HPV56 E2	11	6		HPV56 E6	10	134
HPV56 E2	8	73		HPV56 E6	8	17
HPV56 E2	9	73		HPV56 E6	10	17
HPV56 E2	10	73		HPV56 E6	11	17
HPV56 E2	8	253		HPV56 E6	9	94
HPV56 E2	9	253		HPV56 E6	10	94
HPV56 E2	9	246		HPV56 E6	11	94
HPV56 E2	10	251		HPV56 E6	8	54
HPV56 E2	11	251		HPV56 E6	10	54
HPV56 E2	8	293		HPV56 E6	8	75
HPV56 E2	9	272		HPV56 E6	10	75
HPV56 E2	10	272		HPV56 E6	10	78
HPV56 E2	10	26		HPV56 E6	9	71
HPV56 E2	8	141		HPV56 E6	11	71
HPV56 E2	8	28		HPV56 E6	11	130
HPV56 E2	10	28		HPV56 E6	10	26
HPV56 E2	10	259		HPV56 E6	11	103
HPV56 E2	9	36		HPV56 E6	10	70
HPV56 E2	10	36		HPV56 E6	8	113
HPV56 E2	11	36		HPV56 E6	9	40
HPV56 E2	9	27		HPV56 E6	9	55
HPV56 E2	11	27		HPV56 E6	9	47
HPV56 E2	11	237		HPV56 E6	11	47
HPV56 E2	11	62		HPV56 E6	11	25
HPV56 E2	10	63		HPV56 E6	9	112
HPV56 E2	9	45		HPV56 E6	9	62
HPV56 E2	10	35		HPV56 E6	10	62
HPV56 E2	11	35		HPV56 E6	11	62
HPV56 E2	9	270		HPV56 E6	10	98
HPV56 E2	11	270		HPV56 E6	10	119
HPV56 E2	10	79		HPV56 E6	9	127
HPV56 E2	11	111		HPV56 E6	11	30
HPV56 E2	8	74		HPV56 E6	8	80
HPV56 E2	9	74		HPV56 E6	10	93
HPV56 E2	9	102		HPV56 E6	11	93
HPV56 E2	10	102		HPV56 E6	9	14
HPV56 E2	8	81		HPV56 E6	11	14
HPV56 E2	10	101		HPV56 E6	10	85
HPV56 E2	11	101		HPV56 E6	10	90
HPV56 E6	11	89		HPV56 E6	9	21
HPV56 E6	8	64		HPV56 E6	11	21
HPV56 E6	9	64		HPV56 E6	9	86
HPV56 E6	10	64		HPV56 E6	9	45
HPV56 E6	11	69		HPV56 E6	11	45

Table X
HLA A24 Supermotif Peptides

HPV56	E6	8	56	HPV56	L1	9	419
HPV56	E6	9	135	HPV56	L1	8	402
HPV56	E6	11	81	HPV56	L1	10	402
HPV56	E7	8	93	HPV56	L1	10	21
HPV56	E7	9	75	HPV56	L1	8	407
HPV56	E7	8	22	HPV56	L1	10	407
HPV56	E7	8	82	HPV56	L1	10	479
HPV56	E7	9	82	HPV56	L1	9	69
HPV56	E7	10	82	HPV56	L1	10	69
HPV56	E7	8	14	HPV56	L1	8	282
HPV56	E7	10	14	HPV56	L1	9	282
HPV56	E7	9	62	HPV56	L1	10	238
HPV56	E7	8	69	HPV56	L1	8	356
HPV56	E7	10	4	HPV56	L1	9	356
HPV56	E7	11	60	HPV56	L1	10	138
HPV56	E7	11	90	HPV56	L1	8	118
HPV56	E7	9	15	HPV56	L1	8	150
HPV56	E7	8	6	HPV56	L1	11	150
HPV56	E7	10	6	HPV56	L1	10	438
HPV56	E7	11	73	HPV56	L1	9	399
HPV56	E7	8	84	HPV56	L1	11	399
HPV56	E7	11	84	HPV56	L1	8	15
HPV56	E7	9	7	HPV56	L1	11	20
HPV56	E7	10	12	HPV56	L1	8	32
HPV56	E7	11	11	HPV56	L1	10	68
HPV56	E7	10	85	HPV56	L1	11	68
HPV56	L1	11	58	HPV56	L1	8	414
HPV56	L1	8	381	HPV56	L1	10	414
HPV56	L1	8	327	HPV56	L1	11	414
HPV56	L1	8	444	HPV56	L1	8	334
HPV56	L1	10	444	HPV56	L1	8	192
HPV56	L1	11	37	HPV56	L1	8	258
HPV56	L1	8	26	HPV56	L1	11	258
HPV56	L1	9	26	HPV56	L1	9	124
HPV56	L1	11	26	HPV56	L1	11	124
HPV56	L1	8	275	HPV56	L1	9	8
HPV56	L1	9	275	HPV56	L1	11	8
HPV56	L1	10	275	HPV56	L1	9	116
HPV56	L1	10	422	HPV56	L1	10	116
HPV56	L1	11	422	HPV56	L1	11	478
HPV56	L1	11	101	HPV56	L1	9	413
HPV56	L1	9	191	HPV56	L1	11	413
HPV56	L1	9	195	HPV56	L1	11	270
HPV56	L1	9	257	HPV56	L1	10	93
HPV56	L1	11	491	HPV56	L1	10	300
HPV56	L1	10	233	HPV56	L1	11	300
HPV56	L1	9	236	HPV56	L1	10	98
HPV56	L1	8	369	HPV56	L1	8	55
HPV56	L1	10	369	HPV56	L1	10	387
HPV56	L1	8	23	HPV56	L1	11	387
HPV56	L1	10	23	HPV56	L1	9	476
HPV56	L1	11	23	HPV56	L1	8	264
HPV56	L1	8	481	HPV56	L1	10	450
HPV56	L1	10	267	HPV56	L1	8	340
HPV56	L1	8	404	HPV56	L1	11	224
HPV56	L1	11	404	HPV56	L1	8	77
HPV56	L1	8	303	HPV56	L1	9	77
HPV56	L1	9	303	HPV56	L1	9	431
HPV56	L1	8	140	HPV56	L1	8	132
				HPV56	L1	9	234

Table X
HLA A24 Supermotif Peptides

HPV56	L1	11	234	HPV56	L1	10	110
HPV56	L1	8	333	HPV56	L1	9	131
HPV56	L1	9	333	HPV56	L1	10	108
HPV56	L1	8	2	HPV56	L1	8	452
HPV56	L1	8	1	HPV56	L1	9	487
HPV56	L1	9	1	HPV56	L1	11	487
HPV56	L1	10	5	HPV56	L1	11	67
HPV56	L1	10	376	HPV56	L1	8	446
HPV56	L1	10	280	HPV56	L1	9	332
HPV56	L1	11	280	HPV56	L1	10	332
HPV56	L1	9	6	HPV56	L1	11	279
HPV56	L1	11	6	HPV56	L1	10	379
HPV56	L1	8	95	HPV56	L1	8	261
HPV56	L1	10	95	HPV56	L1	9	261
HPV56	L1	11	180	HPV56	L1	11	261
HPV56	L1	10	123	HPV56	L1	9	489
HPV56	L1	8	167	HPV56	L1	9	182
HPV56	L1	8	430	HPV56	L1	11	182
HPV56	L1	10	430	HPV56	L1	11	86
HPV56	L1	10	483	HPV56	L1	11	323
HPV56	L1	10	426	HPV56	L1	8	61
HPV56	L1	11	375	HPV56	L1	9	61
HPV56	L1	9	226	HPV56	L1	10	61
HPV56	L1	10	226	HPV56	L1	8	304
HPV56	L1	9	28	HPV56	L1	9	377
HPV56	L1	10	172	HPV56	L1	9	415
HPV56	L1	8	228	HPV56	L1	10	415
HPV56	L1	9	31	HPV56	L1	8	215
HPV56	L1	8	473	HPV56	L1	10	215
HPV56	L1	9	221	HPV56	L1	11	215
HPV56	L1	11	255	HPV56	L1	9	370
HPV56	L1	11	146	HPV56	L1	11	366
HPV56	L1	8	496	HPV56	L1	10	38
HPV56	L1	10	496	HPV56	L1	11	38
HPV56	L1	8	13	HPV56	L1	8	29
HPV56	L1	9	13	HPV56	L1	11	29
HPV56	L1	10	13	HPV56	L1	9	408
HPV56	L1	11	4	HPV56	L1	9	173
HPV56	L1	8	467	HPV56	L1	11	246
HPV56	L1	11	467	HPV56	L1	8	420
HPV56	L1	10	442	HPV56	L1	10	87
HPV56	L1	11	52	HPV56	L1	9	214
HPV56	L1	8	494	HPV56	L1	11	214
HPV56	L1	9	494	HPV56	L1	10	367
HPV56	L1	10	494	HPV56	L1	10	324
HPV56	L1	9	406	HPV56	L1	11	324
HPV56	L1	11	406	HPV56	L1	9	281
HPV56	L1	11	189	HPV56	L1	10	281
HPV56	L1	8	288	HPV56	L1	8	7
HPV56	L1	8	339	HPV56	L1	10	7
HPV56	L1	9	339	HPV56	L1	9	423
HPV56	L1	10	384	HPV56	L1	10	423
HPV56	L1	10	213	HPV56	L1	9	268
HPV56	L1	9	395	HPV56	L1	8	396
HPV56	L1	11	395	HPV56	L1	10	396
HPV56	L1	9	103	HPV56	L1	8	283
HPV56	L1	10	159	HPV56	L1	9	325
HPV56	L1	9	76	HPV56	L1	10	325
HPV56	L1	10	76	HPV56	L1	8	62
HPV56	L1	8	110	HPV56	L1	9	62

Table X
HLA A24 Supermotif Peptides

Name		Length	Position	Name		Length	Position
HPV56	L2	9	240	HPV56	L2	8	235
HPV56	L2	11	286	HPV56	L2	9	255
HPV56	L2	8	438	HPV56	L2	11	255
HPV56	L2	11	303	HPV56	L2	8	161
HPV56	L2	10	246	HPV56	L2	8	50
HPV56	L2	11	246	HPV56	L2	10	50
HPV56	L2	9	367	HPV56	L2	9	181
HPV56	L2	10	14	HPV56	L2	8	337
HPV56	L2	10	201	HPV56	L2	11	337
HPV56	L2	8	275	HPV56	L2	8	106
HPV56	L2	11	322	HPV56	L2	8	248
HPV56	L2	11	406	HPV56	L2	9	248
HPV56	L2	8	425	HPV56	L2	8	347
HPV56	L2	9	83	HPV56	L2	8	121
HPV56	L2	11	30	HPV56	L2	10	121
HPV56	L2	9	429	HPV56	L2	9	353
HPV56	L2	11	429	HPV56	L2	11	179
HPV56	L2	8	331	HPV56	L2	10	278
HPV56	L2	10	398	HPV56	L2	9	385
HPV56	L2	8	175	HPV56	L2	10	388
HPV56	L2	10	444	HPV56	L2	8	395
HPV56	L2	8	241	HPV56	L2	8	417
HPV56	L2	9	122	HPV56	L2	8	400
HPV56	L2	10	287	HPV56	L2	10	400
HPV56	L2	9	51	HPV56	L2	8	325
HPV56	L2	9	401	HPV56	L2	10	325
HPV56	L2	10	217	HPV56	L2	9	374
HPV56	L2	11	217	HPV56	L2	8	214
HPV56	L2	8	188	HPV56	L2	10	209
HPV56	L2	10	188	HPV56	L2	10	254
HPV56	L2	11	118	HPV56	L2	9	160
HPV56	L2	9	346	HPV56	L2	10	392
HPV56	L2	11	25	HPV56	L2	11	392
HPV56	L2	8	258	HPV56	L2	9	73
HPV56	L2	10	206	HPV56	L2	9	336
HPV56	L2	10	62	HPV56	L2	9	98
HPV56	L2	10	310	HPV56	L2	9	410
HPV56	L2	11	310	HPV56	L2	8	185
HPV56	L2	8	269	HPV56	L2	11	185
HPV56	L2	9	269	HPV56	L2	9	423
HPV56	L2	11	269	HPV56	L2	10	423
HPV56	L2	8	156	HPV56	L2	8	312
HPV56	L2	9	372	HPV56	L2	9	312
HPV56	L2	11	372	HPV56	L2	10	312
HPV56	L2	11	151	HPV56	L2	8	16
HPV56	L2	9	318	HPV56	L2	9	172
HPV56	L2	10	180	HPV56	L2	10	172
HPV56	L2	8	44	HPV56	L2	11	172
HPV56	L2	10	44	HPV56	L2	8	306
HPV56	L2	11	44	HPV56	L2	9	233
HPV56	L2	9	279	HPV56	L2	10	233
HPV56	L2	11	81	HPV56	L2	8	46
HPV56	L2	10	407	HPV56	L2	9	46
HPV56	L2	11	103	HPV56	L2	11	295
HPV56	L2	11	34	HPV56	L2	8	220
HPV56	L2	8	43	HPV56	L2	8	298
HPV56	L2	9	43	HPV56	L2	8	316
HPV56	L2	11	43	HPV56	L2	11	316
HPV56	L2	8	38	HPV56	L2	8	436
HPV56	L2	10	38	HPV56	L2	9	436

Table X
HLA A24 Supermotif Peptides

```
HPV56 L2    10    436
HPV56 L2     8    343
HPV56 L2     9    343
HPV56 L2     9    49
HPV56 L2    11    49
HPV56 L2     8    154
HPV56 L2     9    154
HPV56 L2    10    154
HPV56 L2    10    212
HPV56 L2    10    183
HPV56 L2     8    134
HPV56 L2    10    134
HPV56 L2    10    148
HPV56 L2    11    414
HPV56 L2     9    365
HPV56 L2    11    365
HPV56 L2     9    95
HPV56 L2     9    111
HPV56 L2    10    191
HPV56 L2    10    304
HPV56 L2     9    105
HPV56 L2     9    247
HPV56 L2    10    247
HPV56 L2     8    386
HPV56 L2     8    136
HPV56 L2     9    288
HPV56 L2     9    135
HPV56 L2     9    149
HPV56 L2     9    39
HPV56 L2    10    415
HPV56 L2     8    52
HPV56 L2     8    112
HPV56 L2    11    112
HPV56 L2     9    408
HPV56 L2    11    408
HPV56 L2     9    389
HPV56 L2    10    104
HPV56 L2     8    84
HPV56 L2    10    31
HPV56 L2     8    430
HPV56 L2    10    430
HPV56 L2    11    430
HPV56 L2    11    443
HPV56 L2     9    431
HPV56 L2    10    431
HPV56 L2    11    71
HPV56 L2     8    319
```

Table XA HPV6A
HLA-A24 Supermotif Peptides

2	3	4		2	3	4
E1	10	377		E2	8	35
E1	11	392		E2	9	35
L2	9	238		E2	10	35
L2	10	238		E1	8	488
L2	8	275		L1	9	153
E1	9	251		E1	10	14
E1	11	251		E6	8	131
E5	9	23		E6	11	131
E5	10	23		E6	8	31
E5	11	23		E1	10	640
L2	8	286		E4	9	64
L2	11	286		E1	8	529
E2	8	72		E1	9	529
E2	11	72		E6	9	140
L2	10	112		E6	10	140
E1	11	22		E5	8	75
E4	8	14		E5	11	75
E4	9	14		E6	8	104
E4	11	14		E1	9	385
E1	11	520		E1	10	385
E1	10	207		E1	8	49
L1	8	81		E5	9	39
L2	8	421		E5	11	39
L2	9	421		E1	8	369
E1	10	554		E1	10	369
E1	11	554		L1	9	219
E6	8	37		L2	10	278
E6	10	37		E6	10	96
E5	8	79		E6	11	96
E1	9	319		E7	8	75
L1	11	22		E7	9	75
E1	11	296		E7	10	75
E4	9	61		L2	9	404
L2	10	14		E1	8	570
E1	8	525		E1	10	570
E1	9	525		E1	11	570
E6	11	10		L2	11	347
E1	10	77		L2	10	396
E1	11	77		E2	9	313
E1	10	101		E1	11	81
L1	9	43		E2	9	25
E1	10	601		L1	8	366
E1	9	271		L1	11	366
L1	11	384		E7	10	14
E6	8	47		L1	11	208
E6	9	47		E1	10	203
L1	8	25		E1	11	46
L1	9	25		L1	10	195
L1	10	25		E2	11	141
E1	10	612		L2	10	344
E1	9	215		L1	9	198
E1	10	215		E1	9	481
E5	8	27		E1	11	481
E5	10	27		E1	10	73
E5	11	27		L1	8	331
E6	8	67		L1	10	331
E6	11	67		E1	8	534
E6	9	137		L1	11	411
E2	9	296		L2	11	30
				E6	8	99

Table XA HPV6A
HLA-A24 Supermotif Peptides

L2	11	258
E2	10	136
E1	9	236
L1	9	146
L1	10	229
E2	9	130
E6	9	69
E1	9	453
E1	11	453
L2	9	192
E1	9	105
E1	11	105
L2	10	120
E6	10	42
L1	11	453
E1	8	197
E1	10	604
E1	11	604
E1	9	131
E2	10	17
E2	9	74
E2	10	74
E1	10	417
E1	11	417
E1	11	360
E2	11	100
E7	10	73
E7	11	73
E6	10	92
E6	11	92
L2	8	135
E4	9	75
E2	9	185
E7	10	39
E1	9	39
E6	8	113
E6	9	113
L1	10	262
L1	11	262
L1	8	103
L1	9	381
L1	8	443
E7	10	78
E2	10	205
E1	9	339
E1	8	379
L1	8	364
L1	10	364
L1	9	357
L1	11	357
E2	9	86
E1	9	613
E1	11	613
L1	9	243
L1	10	243
E5	10	67
L1	8	244
L1	9	244
E1	8	220
L1	8	369

L1	10	369
E6	8	126
E1	8	454
E1	10	454
E1	11	454
L2	8	428
L2	9	428
E5	8	40
E5	10	40
E5	9	68
E1	10	393
E2	11	346
L2	8	398
L2	10	398
E1	9	446
E1	10	446
L1	8	245
E1	8	457
E1	9	457
L2	8	239
L2	9	239
L2	11	239
E1	9	587
E2	8	171
E5	9	28
E5	10	28
E5	8	24
E5	9	24
E5	10	24
E5	11	24
L1	10	441
L1	9	33
L1	10	33
L2	8	434
L2	9	434
L1	10	200
E1	8	241
E2	8	361
L2	8	433
L2	9	433
L2	10	433
L1	8	318
L1	9	318
E1	10	243
E1	11	194
E1	9	326
E2	9	156
E1	9	350
L1	10	101
E7	8	22
E1	8	217
E1	11	217
L1	10	400
L2	8	292
L1	9	144
L1	11	144
E2	8	55
E1	10	273
E1	8	191
E1	9	191

Table XA HPV6A
HLA-A24 Supermotif Peptides

L2	10	215		E7	11	5
L2	11	215		E2	11	32
L2	8	25		E1	8	75
L2	8	64		L2	9	318
L2	11	64		E1	10	412
E1	8	436		L1	9	370
E1	11	436		L1	10	32
E7	9	85		L1	11	32
L1	9	407		E5	8	21
L2	10	413		E5	11	21
E1	8	467		E5	10	31
E1	10	467		E5	11	31
L2	8	75		L2	9	113
L1	9	222		L2	9	279
L1	10	222		E6	9	97
E5	8	11		E6	10	97
E5	11	11		E1	10	195
E4	8	90		L2	8	178
E4	10	90		E5	9	32
E1	8	316		E5	10	32
L2	9	51		L2	10	44
L1	9	111		L2	11	44
L1	10	111		E5	8	17
E2	10	242		E6	8	120
L1	8	113		E6	10	120
L1	11	113		L2	8	405
E1	8	16		L2	8	429
E1	8	44		E1	11	56
E6	11	58		E1	9	571
L1	11	64		E1	10	571
L1	8	468		L1	8	376
L2	8	312		L1	10	376
L2	9	312		L1	11	376
L2	10	312		E1	11	341
E2	10	53		L2	9	185
L2	9	177		L2	11	185
E6	8	119		L2	11	131
E6	9	119		L1	10	187
E6	11	119		L2	8	247
E1	9	264		E1	11	476
E1	11	264		L2	9	121
E4	8	59		L2	11	121
E4	11	59		E1	10	443
E2	10	78		E2	11	287
E2	10	310		E1	10	23
E4	10	10		L2	10	104
E6	9	25		L2	11	104
L1	8	387		E5	8	34
L1	11	387		E5	10	34
E4	10	26		E5	9	41
L2	8	306		E5	11	41
E1	9	581		L2	10	348
L1	9	361		E1	10	531
L1	10	361		E1	11	531
L1	11	361		E6	9	43
E2	8	29		L1	10	286
E1	8	502		E2	8	157
E1	9	502		E2	11	157
E1	10	502		L1	9	79
E7	9	5		L1	10	79

Table XA HPV6A
HLA-A24 Supermotif Peptides

E2	10	120		E1	8	557
E1	8	211		E5	9	16
E1	10	211		E6	11	101
E1	11	211		E1	10	491
L1	8	462		E2	8	314
L1	9	449		L1	11	186
L1	11	449		L2	9	246
E1	8	433		E5	8	33
E1	11	433		E5	9	33
E6	8	73		E5	11	33
E6	10	73		L1	8	41
E2	10	351		L1	9	41
E1	9	312		L1	11	41
E1	10	312		E1	10	521
E1	11	312		E1	11	521
E2	9	359		E1	9	540
E2	10	359		E1	9	208
E1	8	254		E1	11	208
E1	9	254		E7	11	83
E6	11	128		E4	8	8
E1	8	357		E1	11	198
E1	10	357		E2	8	82
L2	11	22		E2	11	82
E1	8	420		E7	8	82
E2	9	84		E5	9	59
E2	11	84		E5	10	59
E6	10	18		E5	11	59
E4	8	42		E5	11	55
L1	10	56		E5	8	51
L2	11	34		E5	9	51
E2	11	147		E5	10	51
E6	11	116		E5	11	51
E6	8	52		E1	9	298
E6	10	52		E1	10	298
E2	11	63		E1	11	298
L1	10	61		E5	8	69
L1	8	19		E5	8	60
L1	10	71		E5	9	60
L2	8	46		E5	10	60
L2	9	46		E5	11	60
E2	8	177		E5	9	72
E1	11	85		E5	10	72
E1	10	578		E5	11	72
L1	8	226		E1	9	563
E4	8	18		E5	10	56
E1	9	401		E2	8	42
E2	9	311		E2	10	42
E2	11	311		E5	8	52
L1	9	87		E5	9	52
L1	11	87		E5	10	52
L1	10	242		E1	8	132
L1	11	242		E1	9	358
L2	9	397		L2	10	23
L2	11	397		E6	9	121
L1	8	302		E1	9	555
E1	11	66		E1	10	555
E6	8	54		E5	8	49
L2	8	107		E5	9	49
E1	8	255		E5	10	49
E1	11	255		E5	11	49

Table XA HPV6A
HLA-A24 Supermotif Peptides

E5	11	70		L2	8	38
E1	9	268		L2	10	38
E1	10	268		E1	11	96
E6	9	38		E2	8	127
E6	11	38		L2	9	385
E5	8	61		L1	11	142
E5	9	61		E2	9	348
E5	10	61		E1	9	609
L2	9	338		E1	8	439
L2	11	338		E1	9	439
E5	8	73		E1	10	594
E5	9	73		E1	8	456
E5	10	73		E1	9.	456
E1	8	514		E1	10	456
E1	9	514		L2	8	415
E5	8	47		L2	9	325
E5	9	47		L2	11	325
E5	10	47		L1	11	217
E5	11	47		L2	10	189
L1	8	295		E1	11	442
L1	9	295		E6	11	110
E1	8	564		L1	9	183
E7	10	67		L1	8	458
L1	8	95		L2	10	73
E5	9	57		L1	11	109
E5	11	57		E7	8	47
E1	8	261		E1	8	562
E2	9	18		E1	10	562
E2	9	43		E5	9	64
E4	9	11		E5	10	64
E4	11	11		E1	8	258
E5	8	53		E1	10	258
E5	9	53		E1	11	258
E4	8	5		L2	9	389
E4	9	5		L2	10	389
E4	11	5		L2	11	389
E1	8	320		L2	10	337
E1	8	306		E1	9	513
E2	8	151		E1	10	513
E2	9	151		E1	11	545
E1	10	47		L2	9	408
L1	9	196		E2	9	354
L1	11	196		E2	10	354
L1	8	154		L2	8	183
E1	9	274		L2	11	183
E1	10	361		L1	11	426
E2	10	101		L2	9	359
L1	10	1		L1	8	90
E2	9	170		L2	9	96
E1	10	568		E2	9	258
E1	8	451		E2	10	258
E1	11	451		L2	8	171
L1	11	31		L2	9	171
E1	8	300		L2	10	171
E1	9	300		L2	9	426
L1	10	445		L2	10	426
E1	8	539		L2	11	426
E1	10	539		E7	10	20
L1	9	438		E5	10	19
E6	9	21		L1	8	266

Table XA HPV6A
HLA-A24 Supermotif Peptides

L1	10	175		E1	11	266
L1	11	16		L1	8	456
L2	11	418		L1	9	456
L2	9	363		L1	10	456
L2	10	363		E6	10	76
L2	9	382		L1	9	66
E2	9	91		E6	9	125
E2	11	91		L2	8	298
E4	11	71		L2	8	316
E6	9	60		L2	11	316
E6	11	60		E2	9	7
L1	8	237		E2	10	7
L1	9	237		L1	11	241
L1	10	237		E1	8	125
L1	8	435		L2	10	245
E1	9	90		L1	9	40
E5	8	66		L1	10	40
E5	11	66		E2	9	303
L1	9	368		E2	10	303
L1	11	368		E1	8	616
E1	10	355		E7	11	66
E2	9	163		L1	9	94
E2	8	345		E1	11	324
E1	8	445		E1	9	293
E1	10	445		L1	8	279
E1	11	445		L1	9	279
E2	9	289		L2	9	221
E5	10	7		L1	8	140
E5	11	7		E1	11	583
L2	8	43		E2	11	301
L2	11	43		L2	11	295
E6	11	28		L1	8	414
E6	8	15		E1	9	219
E6	10	15		E1	8	493
L1	11	151		L1	11	440
L1	8	301		E1	9	547
L1	9	301		E1	11	547
E6	10	50		L2	8	153
E7	9	81		L2	10	267
L2	8	16		L2	11	267
E4	8	4		E5	8	30
E4	9	4		E5	11	30
E4	10	4		E2	8	207
L1	11	232		L2	8	392
L1	8	250		E1	9	247
E2	9	48		E1	10	247
E2	8	76		L1	9	375
E1	9	305		L1	11	375
L1	9	210		L2	11	103
L1	11	210		L1	11	285
E2	8	103		E1	8	60
E1	10	128		L1	10	86
E1	8	344		L2	9	49
L2	9	231		L2	11	49
L2	10	231		L2	8	106
L2	8	233		L2	9	106
E1	8	363		E1	11	490
E2	11	183		E2	9	81
E1	10	425		L1	9	294
E1	9	266		L1	10	294

Table XA HPV6A
HLA-A24 Supermotif Peptides

E1	8	260		L1	8	408
E1	9	260		E1	8	556
E6	11	23		E1	9	556
L2	10	304		E5	8	15
E2	8	150		E5	10	15
E2	9	150		E7	9	7
E2	10	150		E5	8	50
E2	9	23		E5	9	50
E2	11	23		E5	10	50
E2	9	180		E5	11	50
E5	8	14		E1	10	297
E5	9	14		E1	11	297
E5	11	14		E5	10	71
L2	10	374		E5	11	71
L2	9	241		E2	9	93
E6	10	7		E2	10	93
E2	8	201		E6	8	26
E1	10	289		L1	9	377
E1	11	289		L1	10	377
E1	10	331		E1	11	408
E1	11	331		E2	11	128
L1	8	348		L1	10	388
L1	11	348		E6	8	39
L1	8	189		E6	10	39
L1	8	392		E1	11	232
L1	10	392		L1	8	223
E2	10	40		L1	9	223
E5	8	45		L1	11	223
E5	9	45		E6	8	142
E5	10	45		E1	9	585
E5	11	45		E1	11	585
L2	9	260		E6	10	11
E1	11	185		E5	8	62
E2	11	198		E5	9	62
L2	10	145		E5	11	62
L2	11	145		L1	9	332
L1	8	343		L2	10	151
E2	8	144		L1	11	345
E6	10	45		E5	10	12
E6	11	45		E5	11	12
E1	8	485		L2	11	150
E1	10	485		E4	8	76
E1	11	485		E6	11	87
L2	9	345		L2	8	386
E6	9	19		E4	9	91
E6	11	19		E1	9	290
E1	8	588		E1	10	290
L2	11	406		E6	10	88
E1	8	586		E6	11	88
E1	10	586		E4	9	73
L2	9	39		E4	11	73
E1	10	97		E1	9	332
E6	9	12		E1	10	332
E6	11	12		L2	11	387
E2	8	355		E1	9	78
E2	9	355		E1	10	78
E2	11	355		E4	8	92
L2	10	184		L1	11	328
E1	8	294		L1	9	57
E7	8	86		L1	11	57

Table XA HPV6A
HLA-A24 Supermotif Peptides

E6	10	132		E2	9	137
E2	11	336		E1	9	426
L1	10	412		E5	8	36
L1	10	349		E1	8	340
L1	11	349		E1	8	530
L2	8	52		E1	11	530
L2	8	427		E1	11	464
L2	9	427		E5	8	58
L2	10	427		E5	10	58
E1	11	346		E5	11	58
E1	8	333		E1	8	267
E1	9	333		E1	10	267
E5	9	20		E1	11	267
L2	10	31		E2	8	92
E1	11	499		E2	10	92
L1	9	393		E2	11	92
E6	9	53		E6	8	141
E4	9	7		E6	9	141
E1	8	275		E4	10	72
E2	9	41		E1	8	237
E2	11	41		L2	11	440
L1	8	73		L2	10	441
L1	10	73		E1	9	486
E5	8	48		E1	10	486
E5	9	48		L2	8	319
E5	10	48		L1	10	385
E5	11	48		E4	8	12
E5	8	46		E4	10	12
E5	9	46		E4	11	12
E5	10	46		E1	10	86
E5	11	46		L2	8	435
L1	8	382		E1	9	579
L2	10	419		E1	11	579
L2	11	419		E5	8	54
E7	8	6		L1	9	230
E7	10	6		E1	9	532
L2	8	364		E1	10	532
L2	9	364		L1	8	358
L1	8	27		L1	10	358
L2	9	146		E1	11	536
L2	10	146		E2	9	159
E1	10	584		E2	10	159
E1	11	238		L1	9	350
E5	8	25		L1	10	350
E5	9	25		E5	9	43
E5	10	25		E5	10	43
L1	10	329		E5	11	43
E2	8	349		E1	8	402
L1	9	72		E4	8	6
L1	11	72		E4	10	6
L1	8	58		E2	11	168
L1	10	58		L1	9	287
E7	9	68		E2	8	138
E5	9	35		E1	8	91
E4	8	65		L1	8	26
L2	11	253		L1	9	26
E1	9	602		E2	8	131
E5	8	42		E2	10	158
E5	10	42		E2	11	158
E5	11	42				

Table XB HPV6B
HLA-A24 Supermotif Peptides

2	3	4		2	3	4
E1	10	377		E1	9	234
E5B	9	21		E1	11	234
E5B	10	21		E6	8	67
E5B	11	21		E6	11	67
E1	11	392		E6	9	137
L2	9	238		E2	9	296
L2	10	238		E2	8	35
L2	8	275		E2	9	35
E1	9	251		E2	10	35
E1	11	251		E1	8	488
E5A	9	23		L1	9	153
E5A	10	23		E1	10	14
E5A	11	23		E6	8	131
L2	8	286		E6	11	131
L2	11	286		E6	8	31
E2	8	72		E1	10	640
E2	11	72		E4	9	74
L2	10	112		E1	8	529
E1	11	22		E1	9	529
E4	8	24		E6	9	140
E4	9	24		E6	10	140
E4	11	24		E5A	8	75
E1	11	520		E5A	10	75
E1	10	207		E5A	11	75
L1	8	81		E6	8	104
L2	8	421		E1	9	385
L2	9	421		E1	10	385
E1	10	554		E1	8	49
E1	11	554		E1	8	369
E6	8	37		E1	10	369
E6	10	37		L1	9	219
E5A	8	79		L2	10	278
E1	9	319		E6	10	96
L1	11	22		E6	11	96
E1	11	296		E7	8	75
E4	9	71		E7	9	75
L2	10	14		E7	10	75
E1	8	525		L2	9	403
E1	9	525		E1	8	570
E6	11	10		E1	10	570
E1	10	77		E1	11	570
E1	11	77		L2	11	347
E1	10	101		L2	10	395
L1	9	43		E2	9	25
E1	10	601		E2	9	313
E1	9	271		E1	11	81
E1	10	271		L1	8	366
L1	11	384		L1	11	366
E6	8	47		E7	10	14
E6	9	47		L1	11	208
L1	8	25		E1	10	203
L1	9	25		E1	11	46
L1	10	25		L1	10	195
E1	10	612		L2	10	344
E1	9	215		L1	9	198
E1	10	215		E1	9	481
E5A	8	27		E1	11	481
E5A	10	27		E1	10	73
E5A	11	27		L1	8	331
				L1	10	331

Table XB HPV6B
HLA-A24 Supermotif Peptides

E5B	8	11		E1	9	613
E5B	9	11		E1	11	613
E2	9	143		L1	9	243
E1	8	534		L1	10	243
L1	11	411		E5A	10	67
L2	11	30		L1	8	244
E6	8	99		L1	9	244
L2	11	258		E1	8	220
E2	9	348		L1	8	369
E2	10	136		L1	10	369
E1	9	236		E6	8	126
L1	9	146		E5A	9	16
L1	10	229		E1	8	454
E2	9	130		E1	10	454
E6	9	69		E1	11	454
E1	9	453		L2	8	428
E1	11	453		L2	9	428
E5A	9	39		E5B	8	22
E5A	11	39		E5B	9	22
E1	9	105		E5B	10	22
E1	11	105		E5B	11	22
L2	10	120		E5A	8	40
E6	10	42		E5A	10	40
L1	11	453		E2	11	346
E1	8	197		E5A	9	68
E1	10	604		E1	10	393
E1	11	604		L2	8	397
E1	9	131		L2	10	397
E2	10	17		E1	9	446
E2	9	74		E1	10	446
E2	10	74		L1	8	245
E1	10	417		L2	8	239
E1	11	417		L2	9	239
E1	11	360		L2	11	239
E2	11	100		E1	8	457
E7	10	73		E1	9	457
E7	11	73		E1	9	587
E6	10	92		E2	8	171
E6	11	92		E5A	9	28
L2	8	135		E5A	10	28
E4	9	85		E5A	8	24
E2	9	185		E5A	9	24
E7	10	39		E5A	10	24
E1	9	39		E5A	11	24
E6	8	113		L1	10	441
E6	9	113		L1	9	33
L1	10	262		L1	10	33
L1	11	262		L2	8	434
L1	8	103		L2	9	434
L1	9	381		L1	10	200
L1	8	443		E1	8	241
E7	10	78		E2	8	361
E2	10	205		L2	8	433
E1	9	339		L2	9	433
E1	8	379		L2	10	433
L1	8	364		L1	8	318
L1	10	364		L1	9	318
L1	9	357		E1	10	243
L1	11	357		E1	11	194
E2	9	86		E1	9	326

Table XB HPV6B
HLA-A24 Supermotif Peptides

E2	9	156		E6	10	50
E1	9	350		E4	10	20
L1	10	101		E6	9	25
E7	8	22		L1	8	387
E1	8	217		L1	11	387
E1	11	217		E4	10	36
L1	10	400		L2	8	306
L2	8	292		E1	9	581
E5B	8	15		L1	9	361
E5B	9	15		L1	10	361
L1	9	144		L1	11	361
L1	11	144		E2	8	29
E5B	8	25		E1	8	502
E5B	10	25		E1	9	502
E2	8	55		E1	10	502
E1	8	273		E7	9	5
E1	10	273		E7	11	5
E1	8	191		E2	11	183
E1	9	191		E2	11	32
L2	10	215		E1	8	75
L2	11	215		L2	9	318
L2	8	25		E1	10	412
L2	8	64		E5B	8	61
L2	11	64		E5B	9	61
E1	8	436		E5B	10	61
E1	11	436		E5B	11	61
L1	9	407		L1	9	370
E7	9	85		L1	10	32
L2	11	412		L1	11	32
E1	8	467		E5A	8	21
E1	10	467		E5A	11	21
L1	9	222		E5A	10	31
L1	10	222		E5A	11	31
E5A	8	11		L2	9	113
E5A	11	11		L2	9	279
E4	8	100		E6	9	97
E4	10	100		E6	10	97
E1	8	316		E1	10	195
L2	9	51		E5A	9	32
L1	9	111		E5A	10	32
L1	10	111		L2	10	44
E2	10	242		L2	11	44
L1	8	113		E5A	8	17
L1	11	113		E6	8	120
E1	8	16		E6	10	120
E1	8	44		L2	8	404
E6	11	58		L2	8	429
L1	11	64		E1	11	56
L1	8	468		E1	9	571
L2	8	312		E1	10	571
L2	9	312		L1	8	376
L2	10	312		L1	10	376
E2	10	53		L1	11	376
E6	8	119		E1	11	341
E6	9	119		L2	11	131
E6	11	119		L1	10	187
E1	9	264		L2	8	247
E1	11	264		E5B	8	23
E2	10	78		E5B	9	23
E2	10	310		E5B	10	23

Table XB HPV6B
HLA-A24 Supermotif Peptides

E1	11	476		E1	11	85
L2	9	121		E1	10	578
L2	11	121		L1	8	226
E1	10	443		E4	8	28
E2	11	287		E1	9	401
E1	10	23		E4	8	8
L2	10	104		E4	9	8
L2	11	104		E4	11	8
E5A	8	34		E2	9	311
E5A	10	34		E2	11	311
E5A	9	41		L1	9	87
E5A	11	41		L1	11	87
L2	10	348		L1	10	242
E1	10	531		L1	11	242
E1	11	531		L2	9	396
E6	9	43		L2	11	396
L1	10	286		L1	8	302
E2	8	157		E1	11	66
E2	11	157		E6	8	54
L1	9	79		L2	8	107
L1	10	79		E1	8	255
E2	10	120		E1	11	255
E1	8	211		E1	8	557
E1	10	211		E6	11	101
E1	11	211		E1	10	491
L1	8	462		E2	8	314
L1	9	449		L1	11	186
L1	11	449		L2	9	246
E1	8	433		E5A	8	33
E1	11	433		E5A	9	33
E6	8	73		E5A	11	33
E6	10	73		L1	8	41
E2	10	351		L1	9	41
E1	9	312		L1	11	41
E1	10	312		E5B	9	18
E1	11	312		E5B	10	18
E2	9	359		E1	10	521
E2	10	359		E1	11	521
E1	8	254		E1	9	540
E1	9	254		E1	9	208
E6	11	128		E1	11	208
E1	8	357		E7	11	83
E1	10	357		E4	8	18
L2	11	22		E1	11	198
E1	8	420		E7	8	82
E6	10	18		E5A	9	59
E4	8	52		E5A	10	59
L1	10	56		E5A	11	59
L2	11	34		E5A	11	55
E2	11	147		E5A	8	51
E6	11	116		E5A	9	51
E6	8	52		E5A	10	51
E6	10	52		E5A	11	51
E2	11	63		E1	9	298
L1	10	61		E1	10	298
L1	8	19		E1	11	298
L1	10	71		E2	8	82
L2	8	46		E2	11	82
L2	9	46		E5A	8	69
E2	8	177		E5A	8	60

Table XB HPV6B
HLA-A24 Supermotif Peptides

E5A	9	60		E4	8	15
E5A	10	60		E4	9	15
E5A	11	60		E4	11	15
E5A	9	72		E1	8	320
E5A	10	72		E5B	9	26
E5A	11	72		E1	8	306
E1	9	563		E2	8	151
E5A	10	56		E2	9	151
E2	8	42		E1	10	47
E2	10	42		L1	9	196
E5A	8	52		L1	11	196
E5A	9	52		L1	8	154
E5A	10	52		E1	9	274
E5B	11	3		E1	10	361
E1	8	132		E2	10	101
E1	9	358		L1	10	1
L2	10	23		E2	9	170
E6	9	121		E1	10	568
E1	8	458		E1	8	451
E1	9	555		E1	11	451
E1	10	555		L1	11	31
E5A	8	49		E4	11	5
E5A	9	49		E1	8	300
E5A	10	49		E1	9	300
E5A	11	49		L1	10	445
E5A	11	70		E1	8	539
E1	9	268		E1	10	539
E1	10	268		L1	9	438
E6	9	38		E6	9	21
E6	11	38		L2	8	38
E5A	8	61		L2	10	38
E5A	9	61		E1	11	96
E5A	10	61		E2	8	127
L2	9	338		E1	8	607
L2	11	338		E1	11	607
E5A	8	73		L2	8	385
E5A	9	73		L1	11	142
E5A	10	73		E1	9	609
E1	8	514		E1	8	439
E1	9	514		E1	9	439
E5A	8	47		E1	10	594
E5A	9	47		E1	10	226
E5A	10	47		E1	8	456
E5A	11	47		E1	9	456
L1	8	295		E1	10	456
L1	9	295		L2	9	414
E1	8	564		L2	9	325
E7	10	67		L2	11	325
L1	8	95		L1	11	217
E5B	8	16		L2	10	189
E5B	11	16		E1	11	442
E5A	9	57		E4	8	69
E5A	11	57		E4	11	69
E1	8	261		E6	11	110
E2	9	18		L1	9	183
E2	9	43		L1	8	458
E4	9	21		L1	11	109
E4	11	21		E7	8	47
E5A	8	53		E1	8	562
E5A	9	53		E1	10	562

Table XB HPV6B
HLA-A24 Supermotif Peptides

E5A	9	64		E5B	9	6
E5A	10	64		E5B	11	6
L2	10	73		E2	9	289
L2	8	389		E5A	10	7
L2	9	389		E5A	11	7
L2	10	389		L2	8	43
E1	8	258		L2	11	43
E1	10	258		E6	11	28
E1	11	258		E6	8	15
L2	10	337		E6	10	15
E1	9	513		L1	11	151
E1	10	513		L1	8	301
E1	11	545		L1	9	301
L2	9	407		E7	9	81
E2	9	354		L2	8	16
E2	10	354		E4	8	14
L1	11	426		E4	9	14
L2	9	359		E4	10	14
L1	8	90		L1	11	232
L2	8	183		L1	8	250
L2	11	183		E2	9	48
L2	9	96		E2	8	76
E2	9	258		E1	9	305
E2	10	258		L1	9	210
L2	8	171		L1	11	210
L2	9	171		E2	8	103
L2	10	171		E1	10	128
L2	9	426		L2	8	75
L2	10	426		E1	8	344
L2	11	426		L2	9	231
E7	10	20		L2	10	231
E5A	10	19		L2	8	233
L1	8	266		E1	8	363
L1	10	175		E1	10	425
L1	11	16		E1	9	266
L2	9	363		E1	11	266
L2	10	363		L1	8	456
L2	9	382		L1	9	456
L2	11	382		L1	10	456
E2	9	91		E6	10	76
E2	11	91		L1	9	66
E4	11	81		E6	9	125
E6	9	60		L2	8	298
E6	11	60		L2	8	316
L1	8	237		L2	11	316
L1	9	237		E2	9	7
L1	10	237		E2	10	7
L1	8	435		L1	11	241
E1	9	90		E1	8	125
E5A	8	66		L2	10	245
E5A	11	66		L1	9	40
L1	9	368		L1	10	40
L1	11	368		E2	9	303
E1	10	355		E2	10	303
E2	9	163		E1	8	616
E2	8	345		E7	11	66
E1	8	445		L1	9	94
E1	10	445		E2	9	84
E1	11	445		E2	11	84
E5B	8	6		E1	11	324

Table XB HPV6B
HLA-A24 Supermotif Peptides

E1	9	293		L1	8	189
L1	8	279		L1	8	392
L1	9	279		L1	10	392
L2	9	221		E2	10	40
L1	8	140		E5A	8	45
E1	11	583		E5A	9	45
E2	11	301		E5A	10	45
L2	11	295		E5A	11	45
L1	8	414		L2	9	260
E1	9	219		E1	11	185
E1	8	493		E2	11	198
L1	11	440		L2	10	145
E1	9	547		L2	11	145
E1	11	547		L1	8	343
L2	8	153		E6	10	45
L2	10	267		E6	11	45
L2	11	267		E1	8	485
E5A	8	30		E1	10	485
E5A	11	30		E1	11	485
E2	8	207		L2	9	345
E1	9	247		E5A	8	15
E1	10	247		E5A	10	15
L1	9	375		E6	9	19
L1	11	375		E6	11	19
L2	11	103		E1	8	588
L1	11	285		L2	11	405
E1	8	60		E1	8	586
L1	10	86		E1	10	586
L2	9	49		L2	9	39
L2	11	49		E1	10	97
L2	8	106		E6	9	12
L2	9	106		E6	11	12
E1	11	490		E2	8	355
E2	9	81		E2	9	355
L2	8	391		E2	11	355
L1	9	294		E1	8	294
L1	10	294		L1	8	408
E1	8	260		E1	8	556
E1	9	260		E1	9	556
E6	11	23		E7	9	7
L2	10	304		E5A	8	50
E2	8	150		E5A	9	50
E2	9	150		E5A	10	50
E2	10	150		E5A	11	50
E2	9	23		E1	10	297
E2	11	23		E1	11	297
E5A	8	14		E5A	10	71
E5A	9	14		E5A	11	71
E5A	11	14		E7	8	86
E2	9	180		E2	9	93
L2	10	374		E2	10	93
L2	9	241		E6	8	26
E6	10	7		L1	9	377
E2	8	201		L1	10	377
E1	10	289		E1	11	408
E1	11	289		E2	11	128
E1	10	331		E5B	10	59
E1	11	331		E5B	11	59
L1	8	348		L1	10	388
L1	11	348		E6	8	39

Table XB HPV6B
HLA-A24 Supermotif Peptides

E6	10	39		E1	11	499
L1	8	223		L1	9	393
L1	9	223		E6	9	53
L1	11	223		E4	9	17
E1	11	232		E1	8	275
E6	8	142		E2	9	41
E5B	8	63		E2	11	41
E5B	9	63		L1	8	73
E1	9	585		L1	10	73
E1	11	585		E5A	8	48
E6	10	11		E5A	9	48
E5A	8	62		E5A	10	48
E5A	9	62		E5A	11	48
E5A	11	62		E5A	8	46
L1	9	332		E5A	9	46
L2	10	151		E5A	10	46
L1	11	345		E5A	11	46
E5A	10	12		E4	9	10
E5A	11	12		E4	10	10
L2	11	150		L1	8	382
E4	8	86		E7	8	6
E6	11	87		E7	10	6
L2	11	386		E5B	11	58
E4	9	101		L2	8	364
E2	11	212		L2	9	364
E1	9	290		L2	11	418
E1	10	290		L1	8	27
E6	10	88		L2	9	185
E6	11	88		L2	11	185
E4	9	83		L2	9	146
E4	11	83		L2	10	146
E1	9	332		E1	10	584
E1	10	332		E1	11	238
L2	10	387		E5A	8	25
L2	11	387		E5A	9	25
E1	9	78		E5A	10	25
E1	10	78		L1	10	329
L2	10	184		E2	8	349
E4	8	102		L1	9	72
L1	11	328		L1	11	72
L1	9	57		L1	8	58
L1	11	57		L1	10	58
E6	10	132		E7	9	68
E5B	8	12		E5A	9	35
E5B	11	12		E4	8	75
E2	8	144		L2	11	253
E2	11	336		E1	9	602
L1	10	412		E5A	8	42
L1	10	349		E5A	10	42
L1	11	349		E5A	11	42
E2	10	213		E2	9	137
L2	8	52		E1	9	426
L2	8	427		E5A	8	36
L2	9	427		E1	8	340
L2	10	427		E1	8	530
E1	11	346		E1	11	530
E1	8	333		E5B	10	13
E1	9	333		E5B	11	13
E5A	9	20		E1	11	464
L2	10	31		E5B	10	17

Table XB HPV6B
HLA-A24 Supermotif Peptides

E5B	11	17
E5A	8	58
E5A	10	58
E5A	11	58
E1	8	267
E1	10	267
E1	11	267
E2	8	92
E2	10	92
E2	11	92
E6	8	141
E6	9	141
E4	10	82
E1	8	237
L2	11	440
L2	10	441
E1	9	486
E1	10	486
L2	8	319
L1	10	385
E4	8	22
E4	10	22
E4	11	22
E1	10	86
L2	8	435
E1	9	579
E1	11	579
E5A	8	54
L1	9	230
E1	9	532
E1	10	532
L1	8	358
L1	10	358
E1	11	536
E2	9	159
E2	10	159
L1	9	350
L1	10	350
E2	9	214
E5A	9	43
E5A	10	43
E5A	11	43
E5B	8	62
E5B	9	62
E5B	10	62
E1	8	402
E4	8	16
E4	10	16
E4	8	9
E4	10	9
E4	11	9
E2	11	168
L1	9	287
E2	8	138
E1	8	91
L1	8	26
L1	9	26
E2	8	131
E2	10	158
E2	11	158

319

Table X C HPV11
HLA-A24 Supermotif Peptides

2	3	4			2	3	4
E5	9	23			E1	10	612
E5	11	23			E1	9	215
E1	10	377			E1	10	215
E1	11	392			E2	10	298
L2	9	237			E5	8	27
L2	8	274			E5	9	27
L2	9	215			E5	10	27
L2	10	215			E5	11	27
E1	9	251			E2	8	35
E1	11	251			E2	9	35
E5	9	22			E6	8	67
E5	10	22			E6	11	67
E5	11	22			E6	9	137
E5	8	79			E2	9	295
E2	8	72			E1	8	488
E2	11	72			L1	9	154
L2	8	285			E7	9	71
L2	11	285			E1	10	14
E1	11	22			E1	10	289
E1	11	520			E1	11	289
L1	8	81			E5	8	73
L2	8	417			E5	9	73
L2	9	417			E5	10	73
E1	10	554			E6	8	31
E1	11	554			E1	10	640
E6	8	37			E4	9	73
E6	10	37			E6	9	140
E4	8	24			E6	10	140
E4	9	24			E1	8	529
E4	11	24			E1	9	529
E1	9	319			E5	8	75
L1	11	22			E5	10	75
L2	10	22			E5	11	75
E1	8	525			E6	8	104
E1	9	525			E6	11	104
E6	11	10			E1	9	385
E5	8	11			E1	10	385
E1	10	77			E1	8	49
E1	11	77			E5	9	39
L1	8	349			E5	11	39
L1	11	349			L2	8	429
E5	9	25			L2	9	429
E5	10	25			L2	10	429
E5	11	25			E1	8	369
E1	10	101			E1	10	369
L1	9	43			L1	9	220
E5	8	26			E2	9	25
E5	10	26			L2	10	277
E1	10	601			E6	10	96
E1	9	271			E6	11	96
E1	10	271			E7	8	75
E6	11	45			E7	9	75
L1	11	385			E7	10	75
E6	9	47			E1	10	203
L1	8	25			E1	8	570
L1	9	25			E1	10	570
L1	10	25			E1	11	570
E1	9	486			L2	9	399
E1	10	486			L2	10	346
					E1	11	81

Table X C HPV11
HLA-A24 Supermotif Peptides

E7	9	81		L1	8	444
L1	8	367		E2	10	205
L1	11	367		L2	10	119
E7	10	14		E1	9	339
L1	11	209		E1	8	379
L1	9	439		L1	9	358
E1	11	46		L1	11	358
L1	10	196		E2	8	130
L2	10	343		E2	9	130
L1	9	199		E2	10	130
E1	9	481		E1	9	613
E1	11	481		E1	11	613
E1	8	191		E5	10	67
E1	9	191		E5	11	67
E2	8	96		L1	9	244
L1	8	332		L1	10	244
L1	10	332		L1	8	370
E5	8	12		L1	10	370
E5	9	12		E6	8	126
E1	8	534		E1	8	454
L1	11	412		E1	10	454
L1	8	125		E1	11	454
L2	11	29		L2	8	424
L2	11	257		L2	9	424
L2	10	391		E1	9	494
E1	9	236		E5	9	68
L1	9	147		E5	10	68
L1	10	230		E1	10	393
L1	8	365		E2	11	345
L1	10	365		E1	9	446
E1	9	453		E1	10	446
E1	11	453		E1	8	457
E6	8	113		E1	9	457
E6	9	113		L2	8	238
E1	9	105		L2	11	238
E1	11	105		E5	8	16
E6	10	42		E5	9	20
E2	9	312		E5	11	20
L1	11	454		E1	9	587
E1	8	197		E1	8	220
E6	9	69		L2	8	393
E1	10	604		L2	10	393
E1	11	604		E5	8	23
E1	9	131		E5	9	23
E2	8	17		E5	10	23
E2	10	17		E5	11	23
E1	10	417		E5	8	40
E1	11	417		E5	10	40
E2	9	74		L1	10	442
E1	11	360		L1	9	33
E2	11	100		L1	10	33
E2	8	66		L2	8	430
E2	10	66		L2	9	430
E6	10	92		L1	8	245
E6	11	92		L1	9	245
E1	10	128		L1	10	201
E2	9	185		E1	8	241
E1	9	39		E2	8	360
L1	8	103		L1	8	319
L1	9	382		L1	9	319

Table X C HPV11
HLA-A24 Supermotif Peptides

E1	10	243		E4	10	36
E1	11	194		L2	8	36
E1	9	326		L2	9	36
E2	9	156		L2	11	36
L1	10	101		L2	11	148
E7	8	22		L2	10	188
E2	8	55		L1	9	362
E1	8	217		L1	10	362
E1	11	217		L1	11	362
L1	10	401		E2	11	183
L2	8	291		E2	11	32
L1	9	145		E1	8	75
L1	11	145		E1	10	412
E1	8	273		L1	9	371
E1	10	273		L1	10	32
L2	8	24		L1	11	32
E1	10	431		E4	11	5
L1	9	408		E5	10	34
E1	11	296		L2	9	278
E7	9	85		E1	10	195
L2	11	408		E6	8	120
E1	8	467		E6	10	120
E1	10	467		L2	8	177
E4	8	99		E5	9	35
E4	10	99		E6	9	97
L1	9	223		E6	10	97
L1	10	223		L2	10	43
L1	11	262		L2	11	43
L2	9	50		E5	8	17
L1	9	111		E5	8	28
L1	10	111		E5	9	28
E1	8	316		E5	10	28
L1	8	113		E1	11	408
L1	11	113		E2	9	30
E1	8	16		L2	8	400
E1	8	44		L2	8	425
L1	11	64		L1	8	377
L2	8	311		L1	10	377
L2	9	311		L1	11	377
E2	10	53		E1	11	56
E6	8	119		E1	11	341
E6	9	119		L2	9	184
E6	11	119		L2	11	184
L2	9	176		L2	10	286
E2	8	29		L2	11	130
E2	10	29		L1	10	188
E1	9	264		E1	10	23
E1	11	264		E5	10	31
E2	10	136		E1	10	443
E2	10	78		E2	11	286
E2	10	309		L2	10	103
E5	8	7		L2	11	103
E5	9	7		L2	9	347
E5	10	7		E6	9	43
E5	11	7		E2	9	137
E4	10	20		L1	10	287
E1	9	305		E2	8	157
E6	9	25		E2	11	157
L1	8	388		L1	9	79
L1	11	388		L1	10	79

Table X C HPV11
HLA-A24 Supermotif Peptides

E2	10	120		L1	8	303
E1	8	211		E1	11	66
E1	10	211		E5	10	19
E1	8	493		L2	8	158
E1	10	493		L2	8	106
L1	8	463		E1	8	255
L1	9	450		E1	11	255
L1	11	450		E5	8	33
E6	8	73		E5	11	33
E6	10	73		E1	8	557
E1	9	312		E1	10	491
E1	10	312		E5	9	16
E1	11	312		E6	11	101
E1	8	254		B5	8	36
E1	9	254		L1	11	187
E6	11	116		L1	8	41
E6	11	128		L1	9	41
E1	8	357		L1	11	41
E1	10	357		E1	10	521
E1	8	420		E1	9	540
E1	10	420		E2	10	15
E4	8	53		E7	11	83
E6	10	18		E2	8	42
E2	9	84		E2	10	42
E2	11	84		E4	8	18
L1	10	56		E4	9	18
E7	10	39		E1	11	198
E1	8	433		E7	8	82
EI	11	433		E5	9	59
L2	11	33		E5	10	59
E2	9	358		E5	11	59
E2	10	358		E5	11	55
E6	8	99		E5	8	51
L1	10	61		E5	9	51
E2	11	147		E5	10	51
L1	8	19		E5	11	51
L1	10	71		E1	9	298
E6	8	52		E1	10	298
E6	10	52		E1	11	298
L2	8	45		E5	8	69
L2	9	45		E5	9	69
L1	11	122		E5	8	60
E2	8	177		E5	9	60
E2	8	306		E5	10	60
E1	11	85		E5	11	60
E1	10	578		E1	9	563
L1	8	227		E5	10	56
E4	8	28		E5	8	52
E1	8	401		E5	9	52
E1	9	401		E5	10	52
E4	8	8		E5	11	4
E4	9	8		E1	8	514
E4	11	8		E1	9	514
L1	9	87		E1	8	132
L1	11	87		E1	9	358
E2	9	310		E5	8	70
E2	11	310		E5	11	70
L1	10	243		E1	9	555
L1	11	243		E1	10	555
E5	9	15		E5	8	49

Table X C HPV11
HLA-A24 Supermotif Peptides

E5	9	49		L1	11	31
E5	10	49		E1	8	300
E5	11	49		E1	9	300
E1	9	268		E2	9	254
E1	10	268		L1	10	446
E2	8	103		E6	10	50
E7	8	48		E1	8	539
L2	8	368		E1	10	539
E6	9	38		E6	9	21
E6	11	38		E2	8	248
E5	8	61		E5	8	54
E5	9	61		E5	9	54
E5	10	61		L2	8	381
L2	9	337		E1	10	97
L2	11	337		L1	11	143
E5	8	47		E2	8	127
E5	9	47		E2	11	127
E5	10	47		E1	9	609
E5	11	47		E1	8	439
L1	8	296		E1	9	439
L1	9	296		E6	9	60
E7	9	5		E6	11	60
E7	11	5		E1	10	594
E1	8	564		E1	8	456
L2	9	245		E1	9	456
E7	10	67		E1	10	456
L1	8	95		L2	9	410
E5	9	57		E4	8	4
E5	11	57		E1	11	442
E1	8	261		E6	8	110
E2	9	18		E6	11	110
E4	8	25		L1	11	218
E4	10	25		L1	9	184
E4	11	25		L2	9	157
E4	9	21		L1	8	459
E4	11	21		L2	10	72
E5	8	53		L1	11	109
E5	9	53		E1	8	562
E4	8	15		E1	10	562
E4	9	15		E5	9	64
E4	11	15		L2	8	385
E1	8	320		L2	9	385
E1	8	306		E1	8	258
E1	10	47		E1	10	258
L1	9	197		E1	11	258
L1	11	197		E1	9	513
L1	8	155		E1	10	513
E1	9	274		E7	8	47
E5	8	1		E7	9	47
E1	10	361		E4	8	68
E4	9	1		L2	10	336
E4	11	1		E1	11	545
E2	10	101		L2	9	403
L1	10	1		E2	9	353
L2	9	304		E2	10	353
E2	9	170		L2	11	182
E6	11	58		L1	11	427
E1	10	568		L2	8	123
E1	8	451		L2	11	206
E1	11	451		L1	8	90

Table X C HPV11
HLA-A24 Supermotif Peptides

E6	11	87		L2	8	232
L2	9	95		E1	8	363
L2	8	170		E6	10	132
L2	9	170		E1	9	266
L2	10	170		E1	11	266
L2	9	422		E2	9	86
L2	10	422		E6	10	76
L2	11	422		L1	9	66
E7	10	20		E6	9	125
L2	10	358		L2	11	294
L2	11	358		L2	8	297
L1	11	16		L2	9	297
L2	9	324		L2	8	315
L2	11	324		E2	9	7
E5	10	19		E2	10	7
E5	11	19		E1	8	125
L2	10	251		L1	11	242
E2	9	91		E4	11	59
E2	11	91		L1	9	40
E4	11	80		L1	10	40
L1	8	238		E2	9	302
L1	9	238		E2	10	302
L1	10	238		E1	8	616
L1	8	436		E7	8	4
E5	11	66		E7	10	4
L1	9	369		L2	10	244
L1	11	369		E7	11	66
E1	10	355		L1	9	94
E2	9	163		E1	11	324
E2	8	344		E1	9	293
E1	8	445		L1	8	473
E1	10	445		L2	9	220
E1	11	445		L1	8	141
L1	8	457		E1	11	583
L1	9	457		E2	8	300
L1	10	457		E2	11	300
E5	10	7		L1	8	415
E5	11	7		E1	9	219
L2	8	42		L1	11	441
L2	11	42		E1	9	247
E6	11	28		E1	10	247
E6	8	15		E2	8	207
E6	10	15		E2	8	23
L1	11	152		E2	9	23
L1	8	302		E2	11	23
L1	9	302		E6	9	12
E2	11	14		E6	11	12
E7	10	78		E1	9	547
E2	9	288		E1	11	547
E4	8	14		L2	10	266
E4	9	14		L2	11	266
E4	10	14		E1	8	422
L1	11	233		L1	9	376
L1	8	251		L1	11	376
E2	9	48		E5	8	30
L1	9	211		E5	11	30
L1	11	211		L2	11	102
E1	8	344		L1	11	286
L2	9	230		E1	9	350
L2	10	230		L1	10	86

Table X C HPV11
HLA-A24 Supermotif Peptides

L2	9	48		E2	8	354
L2	11	48		E2	9	354
E6	11	23		E2	11	354
L2	8	105		L2	10	183
L2	9	105		E5	10	71
E1	11	490		E5	11	71
L2	9	259		L1	8	409
L1	9	295		E1	8	294
L1	10	295		E1	10	207
E1	8	260		E1	8	556
E1	9	260		E1	9	556
L2	10	303		E5	8	15
E2	11	260		E5	10	15
E1	11	206		E7	9	7
E2	9	180		E5	8	50
E2	11	245		E5	9	50
L2	8	209		E5	10	50
L2	10	370		E5	11	50
L2	9	240		E1	10	297
E1	11	185		E1	11	297
E6	10	7		E7	8	86
E4	8	85		E2	9	93
E1	10	331		E2	10	93
E1	11	331		E2	11	93
E2	8	201		E6	8	26
E2	8	151		L1	9	378
E2	9	151		L1	10	378
E2	9	257		L1	10	389
E1	8	60		E6	8	39
L2	8	152		E6	10	39
E1	8	436		E1	11	232
E1	11	436		E6	8	142
L1	8	190		E1	9	585
E2	8	348		E1	11	585
L1	8	393		L2	8	37
L1	10	393		L2	10	37
E2	10	40		E5	9	14
E5	8	45		E5	11	14
E5	9	45		E5	8	62
E5	10	45		E5	9	62
E5	11	45		E5	11	62
L1	10	176		E1	11	116
L1	8	344		L1	9	333
E2	11	198		L2	9	150
L2	11	144		L2	10	150
L2	9	378		E5	10	13
L2	11	378		L2	10	149
L2	10	366		L2	11	149
E1	9	501		E5	11	12
E1	10	501		E5	8	55
E1	11	501		L2	11	382
L2	9	344		E4	9	100
E6	9	19		E1	9	290
E6	11	19		E1	10	290
E1	8	588		L1	8	224
L2	11	401		L1	9	224
E1	8	586		L1	11	224
E1	10	586		E6	10	88
L2	9	38		E6	11	88
E2	10	261		L1	10	263

Table X C HPV11
HLA-A24 Supermotif Peptides

L1	11	263		L2	11	414
E1	9	332		L2	8	325
E1	10	332		L2	10	325
L2	10	383		E2	10	148
L2	11	383		E2	11	148
E1	9	78		E1	10	584
E1	10	78		L2	8	246
E4	9	82		E1	11	238
E4	11	82		E5	8	24
E2	11	63		E5	9	24
E4	8	101		E5	10	24
L1	11	329		L1	10	330
L1	9	57		E7	9	68
L1	11	57		E5	9	20
E5	8	13		E5	10	20
E5	11	13		L1	9	72
E1	10	531		L1	11	72
E1	11	531		E4	8	2
L1	10	413		E4	10	2
E2	11	335		L1	8	58
L1	10	350		L1	10	58
L1	11	350		L2	9	120
L2	8	51		L2	11	120
L2	8	423		E6	9	53
L2	9	423		E2	8	132
L2	10	423		E5	9	41
E5	8	21		E5	11	41
E5	9	21		E4	8	74
E5	11	21		E6	8	54
E1	11	346		L2	9	252
E1	8	333		L2	11	252
E1	9	333		E1	9	602
L2	10	30		E5	11	60
E1	11	499		E5	8	42
L1	9	394		E5	10	42
E5	9	27		E5	11	42
E5	9	32		L2	9	392
E2	9	41		L2	11	392
E2	11	41		E1	8	340
E4	9	17		E5	10	14
E4	10	17		E5	11	18
E1	8	275		E1	11	464
L1	8	73		E5	8	58
L1	10	73		E5	10	58
E5	8	48		E5	11	58
E5	9	48		E1	8	267
E5	10	48		E1	10	267
E5	11	48		E1	11	267
E5	8	46		E2	9	102
E5	9	46		E2	8	92
E5	10	46		E2	10	92
E5	11	46		E2	11	92
E4	9	10		E6	8	141
E4	10	10		E6	9	141
L1	8	383		E4	10	81
E2	10	128		E1	8	530
E2	11	128		E1	11	530
E7	8	6		E1	8	237
E7	10	6		L2	11	436
L2	10	145		L2	10	437

Table X C HPV11
HLA-A24 Supermotif Peptides

E5	9	76
E5	10	76
E5	11	76
L1	10	386
E4	8	22
E4	10	22
E4	11	22
E6	10	105
E1	10	86
L2	8	431
E1	9	579
E1	11	579
E5	8	54
E2	8	138
L1	9	231
L1	8	246
L2	9	367
E1	9	532
E1	10	532
L1	8	359
L1	10	359
E1	11	536
E5	10	61
E2	9	159
E2	10	159
L1	9	351
L1	10	351
L2	8	305
E5	9	43
E5	10	43
E5	11	43
L1	9	288
E1	8	402
L1	8	26
L1	9	26
E4	8	16
E4	10	16
E4	11	16
E4	8	9
E4	10	9
E4	11	9
E2	11	168
E1	8	502
E1	9	502
E1	10	502
E2	8	131
E2	9	131
E2	10	158
E2	11	158

Table XI
HLA-B7 Supermotif Peptides

1	2	3	4
HPV16	E1	10	559
HPV16	E1	9	308
HPV16	E1	10	308
HPV16	E1	11	308
HPV16	E1	10	592
HPV16	E1	11	592
HPV16	E1	8	467
HPV16	E1	9	467
HPV16	E1	10	467
HPV16	E1	11	599
HPV16	E1	8	309
HPV16	E1	9	309
HPV16	E1	10	309
HPV16	E1	11	309
HPV16	E1	9	560
HPV16	E1	11	560
HPV16	E1	8	511
HPV16	E1	10	511
HPV16	E1	11	511
HPV16	E1	11	552
HPV16	E1	10	93
HPV16	E1	9	107
HPV16	E1	10	336
HPV16	E1	11	336
HPV16	E1	9	189
HPV16	E1	10	189
HPV16	E1	8	244
HPV16	E1	11	244
HPV16	E1	11	526
HPV16	E1	8	576
HPV16	E1	9	576
HPV16	E1	10	576
HPV16	E1	11	576
HPV16	E2	11	105
HPV16	E2	11	195
HPV16	E2	9	218
HPV16	E2	10	218
HPV16	E2	11	218
HPV16	E2	11	352
HPV16	E2	8	249
HPV16	E2	9	249
HPV16	E2	9	207
HPV16	E2	10	207
HPV16	E2	10	286
HPV16	E2	11	59
HPV16	E5	10	69
HPV16	E5	10	30
HPV16	E6	9	118
HPV16	E6	9	11
HPV16	E6	8	101
HPV16	E6	11	101
HPV16	E6	8	19
HPV16	E6	10	65
HPV16	E6	8	15
HPV16	E7	9	46
HPV16	E7	10	46
HPV16	E7	11	40
HPV16	E7	8	16
HPV16	E7	10	16
HPV16	E7	8	5
HPV16	E7	9	5
HPV16	E7	11	5
HPV16	L1	10	461
HPV16	L1	10	211
HPV16	L1	11	211
HPV16	L1	8	465
HPV16	L1	9	465
HPV16	L1	11	465
HPV16	L1	8	266
HPV16	L1	9	266
HPV16	L1	10	266
HPV16	L1	11	266
HPV16	L1	11	76
HPV16	L1	8	488
HPV16	L1	9	488
HPV16	L1	11	488
HPV16	L1	8	318
HPV16	L1	9	318
HPV16	L1	11	503
HPV16	L1	8	80
HPV16	L1	9	80
HPV16	L1	8	188
HPV16	L1	8	335
HPV16	L1	9	103
HPV16	L1	9	39
HPV16	L1	10	39
HPV16	L1	8	31
HPV16	L1	9	31
HPV16	L1	8	118
HPV16	L1	9	118
HPV16	L1	10	118
HPV16	L1	8	207
HPV16	L1	10	207
HPV16	L1	11	207
HPV16	L1	9	459
HPV16	L1	10	435
HPV16	L1	9	212
HPV16	L1	10	212
HPV16	L1	11	434
HPV16	L1	8	40
HPV16	L1	9	40
HPV16	L1	8	433
HPV16	L1	8	199
HPV16	L1	10	458
HPV16	L1	11	320
HPV16	L1	11	514
HPV16	L1	9	88
HPV16	L1	11	88
HPV16	L1	9	246
HPV16	L1	8	257
HPV16	L2	9	278
HPV16	L2	10	278
HPV16	L2	11	278
HPV16	L2	8	424
HPV16	L2	8	119
HPV16	L2	9	87
HPV16	L2	9	28
HPV16	L2	11	239
HPV16	L2	8	280

Table XI
HLA-B7 Supermotif Peptides

HPV16 L2	9	280	HPV16 L2	8	123
HPV16 L2	10	280	HPV16 L2	11	123
HPV16 L2	8	102	HPV16 L2	9	385
HPV16 L2	11	165	HPV16 L2	10	385
HPV16 L2	10	96	HPV16 L2	9	382
HPV16 L2	11	96	HPV18 E1	10	566
HPV16 L2	8	413	HPV18 E1	8	513
HPV16 L2	8	99	HPV18 E1	9	513
HPV16 L2	10	99	HPV18 E1	10	518
HPV16 L2	11	99	HPV18 E1	11	518
HPV16 L2	9	394	HPV18 E1	10	599
HPV16 L2	9	400	HPV18 E1	11	599
HPV16 L2	11	400	HPV18 E1	9	484
HPV16 L2	8	216	HPV18 E1	10	484
HPV16 L2	10	216	HPV18 E1	8	576
HPV16 L2	9	416	HPV18 E1	10	576
HPV16 L2	10	428	HPV18 E1	11	576
HPV16 L2	9	33	HPV18 E1	11	559
HPV16 L2	10	33	HPV18 E1	8	641
HPV16 L2	10	73	HPV18 E1	10	641
HPV16 L2	9	408	HPV18 E1	9	193
HPV16 L2	11	408	HPV18 E1	8	251
HPV16 L2	8	196	HPV18 E1	11	251
HPV16 L2	8	126	HPV18 E1	11	606
HPV16 L2	10	126	HPV18 E1	9	567
HPV16 L2	9	357	HPV18 E1	8	316
HPV16 L2	10	357	HPV18 E1	9	316
HPV16 L2	8	462	HPV18 E1	10	316
HPV16 L2	10	462	HPV18 E1	11	316
HPV16 L2	11	462	HPV18 E1	9	263
HPV16 L2	9	254	HPV18 E1	9	315
HPV16 L2	11	206	HPV18 E1	10	315
HPV16 L2	9	160	HPV18 E1	11	315
HPV16 L2	10	160	HPV18 E1	9	447
HPV16 L2	8	29	HPV18 E1	9	97
HPV16 L2	9	127	HPV18 E1	9	110
HPV16 L2	8	91	HPV18 E1	8	343
HPV16 L2	8	79	HPV18 E1	10	343
HPV16 L2	9	79	HPV18 E1	11	343
HPV16 L2	11	79	HPV18 E1	8	474
HPV16 L2	11	171	HPV18 E1	9	474
HPV16 L2	11	291	HPV18 E1	8	307
HPV16 L2	9	90	HPV18 E1	8	583
HPV16 L2	9	78	HPV18 E1	10	583
HPV16 L2	10	78	HPV18 E1	11	583
HPV16 L2	8	220	HPV18 E2	9	261
HPV16 L2	9	220	HPV18 E2	10	261
HPV16 L2	8	434	HPV18 E2	8	352
HPV16 L2	10	434	HPV18 E2	9	352
HPV16 L2	9	173	HPV18 E2	11	352
HPV16 L2	11	173	HPV18 E2	8	248
HPV16 L2	11	142	HPV18 E2	9	226
HPV16 L2	9	214	HPV18 E2	10	3
HPV16 L2	10	214	HPV18 E2	9	224
HPV16 L2	11	345	HPV18 E2	11	224
HPV16 L2	8	245	HPV18 E2	11	271
HPV16 L2	11	380	HPV18 E2	11	63
HPV16 L2	9	431	HPV18 E5	8	59
HPV16 L2	10	431	HPV18 E5	10	59
HPV16 L2	11	431	HPV18 E5	11	59

Table XI
HLA-B7 Supermotif Peptides

HPV18	E5	8	23	HPV18	L1	10	343
HPV18	E5	9	23	HPV18	L1	8	153
HPV18	E5	10	23	HPV18	L1	9	153
HPV18	E5	11	23	HPV18	L1	10	153
HPV18	E5	8	45	HPV18	L1	8	108
HPV18	E5	9	45	HPV18	L1	9	247
HPV18	E5	10	45	HPV18	L1	10	247
HPV18	E5	11	45	HPV18	L1	8	469
HPV18	E5	9	20	HPV18	L1	9	469
HPV18	E5	11	20	HPV18	L1	8	75
HPV18	E6	9	6	HPV18	L1	9	75
HPV18	E6	10	60	HPV18	L1	8	470
HPV18	E6	9	110	HPV18	L1	11	470
HPV18	E6	8	14	HPV18	L1	8	76
HPV18	E6	9	113	HPV18	L1	10	471
HPV18	E6	8	10	HPV18	L1	8	25
HPV18	E7	8	16	HPV18	L1	9	25
HPV18	E7	10	16	HPV18	L1	10	25
HPV18	E7	11	16	HPV18	L1	11	25
HPV18	E7	8	55	HPV18	L1	11	239
HPV18	E7	10	55	HPV18	L1	8	66
HPV18	E7	9	3	HPV18	L1	9	66
HPV18	E7	10	3	HPV18	L1	8	353
HPV18	E7	11	3	HPV18	L1	9	353
HPV18	E7	11	21	HPV18	L1	9	411
HPV18	L1	9	495	HPV18	L1	8	398
HPV18	L1	8	223	HPV18	L1	10	398
HPV18	L1	9	223	HPV18	L1	9	90
HPV18	L1	11	549	HPV18	L1	11	113
HPV18	L1	10	246	HPV18	L1	10	413
HPV18	L1	11	246	HPV18	L1	9	281
HPV18	L1	8	501	HPV18	L1	9	468
HPV18	L1	9	501	HPV18	L1	10	468
HPV18	L1	11	501	HPV18	L1	9	292
HPV18	L1	8	301	HPV18	L1	8	524
HPV18	L1	9	301	HPV18	L1	9	524
HPV18	L1	11	301	HPV18	L1	11	524
HPV18	L1	8	56	HPV18	L2	8	421
HPV18	L1	9	56	HPV18	L2	10	421
HPV18	L1	10	56	HPV18	L2	9	327
HPV18	L1	9	19	HPV18	L2	9	27
HPV18	L1	11	19	HPV18	L2	11	266
HPV18	L1	10	543	HPV18	L2	8	100
HPV18	L1	10	23	HPV18	L2	8	208
HPV18	L1	11	23	HPV18	L2	11	208
HPV18	L1	9	123	HPV18	L2	9	257
HPV18	L1	11	123	HPV18	L2	10	94
HPV18	L1	8	557	HPV18	L2	11	94
HPV18	L1	10	557	HPV18	L2	8	223
HPV18	L1	11	539	HPV18	L2	9	223
HPV18	L1	8	370	HPV18	L2	8	97
HPV18	L1	9	138	HPV18	L2	10	97
HPV18	L1	8	27	HPV18	L2	11	97
HPV18	L1	9	27	HPV18	L2	8	85
HPV18	L1	10	27	HPV18	L2	9	85
HPV18	L1	11	27	HPV18	L2	8	444
HPV18	L1	8	15	HPV18	L2	10	444
HPV18	L1	9	74	HPV18	L2	11	444
HPV18	L1	10	74	HPV18	L2	10	72
HPV18	L1	9	343	HPV18	L2	11	72

Table XI
HLA-B7 Supermotif Peptides

HPV18	L2	8	407	HPV31	E1	10	491
HPV18	L2	10	407	HPV31	E1	11	491
HPV18	L2	11	407	HPV31	E1	9	288
HPV18	L2	8	215	HPV31	E1	10	288
HPV18	L2	11	253	HPV31	E1	11	288
HPV18	L2	9	159	HPV31	E1	9	236
HPV18	L2	10	159	HPV31	E1	10	92
HPV18	L2	11	238	HPV31	E1	9	106
HPV18	L2	8	28	HPV31	E1	10	506
HPV18	L2	8	89	HPV31	E1	11	506
HPV18	L2	11	284	HPV31	E1	10	316
HPV18	L2	9	88	HPV31	E1	11	316
HPV18	L2	8	244	HPV31	E1	9	169
HPV18	L2	10	119	HPV31	E1	10	169
HPV18	L2	10	329	HPV31	E1	8	447
HPV18	L2	11	329	HPV31	E1	9	447
HPV18	L2	9	324	HPV31	E1	8	556
HPV18	L2	10	324	HPV31	E1	9	556
HPV18	L2	10	418	HPV31	E1	10	556
HPV18	L2	11	418	HPV31	E1	11	556
HPV18	L2	10	375	HPV31	E2	11	105
HPV18	L2	9	213	HPV31	E2	8	289
HPV18	L2	10	213	HPV31	E2	10	289
HPV18	L2	9	144	HPV31	E2	11	195
HPV18	L2	9	184	HPV31	E2	11	257
HPV18	L2	9	271	HPV31	E2	11	359
HPV18	L2	10	271	HPV31	E2	10	293
HPV18	L2	9	32	HPV31	E2	9	59
HPV18	L2	10	32	HPV31	E2	11	59
HPV18	L2	9	389	HPV31	E5	10	69
HPV18	L2	11	389	HPV31	E5	9	30
HPV18	L2	8	170	HPV31	E5	10	30
HPV18	L2	11	170	HPV31	E5	11	30
HPV18	L2	9	361	HPV31	E5	8	55
HPV18	L2	10	361	HPV31	E5	9	55
HPV18	L2	11	361	HPV31	E5	10	55
HPV18	L2	11	359	HPV31	E5	11	55
HPV18	L2	9	397	HPV31	E6	9	111
HPV18	L2	11	397	HPV31	E6	8	21
HPV18	L2	9	451	HPV31	E6	11	21
HPV18	L2	10	451	HPV31	E6	9	4
HPV18	L2	11	451	HPV31	E6	8	8
HPV18	L2	8	414	HPV31	E6	11	8
HPV18	L2	10	414	HPV31	E6	8	142
HPV31	E1	8	458	HPV31	E6	10	58
HPV31	E1	9	458	HPV31	E7	8	91
HPV31	E1	11	458	HPV31	E7	9	46
HPV31	E1	10	539	HPV31	E7	10	46
HPV31	E1	10	572	HPV31	E7	10	28
HPV31	E1	11	572	HPV31	E7	11	28
HPV31	E1	11	128	HPV31	E7	10	16
HPV31	E1	11	523	HPV31	E7	8	5
HPV31	E1	11	579	HPV31	E7	9	5
HPV31	E1	8	289	HPV31	E7	11	5
HPV31	E1	9	289	HPV31	L1	10	433
HPV31	E1	10	289	HPV31	L1	10	488
HPV31	E1	11	289	HPV31	L1	10	186
HPV31	E1	9	540	HPV31	L1	11	186
HPV31	E1	11	540	HPV31	L1	8	440
HPV31	E1	8	491	HPV31	L1	9	440

Table XI
HLA-B7 Supermotif Peptides

HPV31	L1	11	440	HPV31	L2	11	234
HPV31	L1	8	241	HPV31	L2	10	96
HPV31	L1	9	241	HPV31	L2	11	96
HPV31	L1	10	241	HPV31	L2	10	421
HPV31	L1	11	241	HPV31	L2	9	406
HPV31	L1	8	463	HPV31	L2	8	99
HPV31	L1	9	463	HPV31	L2	10	99
HPV31	L1	11	463	HPV31	L2	11	99
HPV31	L1	8	293	HPV31	L2	8	125
HPV31	L1	9	293	HPV31	L2	10	125
HPV31	L1	10	139	HPV31	L2	11	125
HPV31	L1	10	52	HPV31	L2	8	211
HPV31	L1	11	52	HPV31	L2	10	211
HPV31	L1	10	436	HPV31	L2	10	123
HPV31	L1	11	436	HPV31	L2	9	401
HPV31	L1	8	163	HPV31	L2	11	401
HPV31	L1	8	310	HPV31	L2	9	87
HPV31	L1	9	78	HPV31	L2	9	33
HPV31	L1	9	13	HPV31	L2	10	33
HPV31	L1	10	13	HPV31	L2	8	191
HPV31	L1	8	396	HPV31	L2	9	327
HPV31	L1	10	396	HPV31	L2	9	249
HPV31	L1	8	93	HPV31	L2	9	155
HPV31	L1	9	93	HPV31	L2	10	155
HPV31	L1	10	93	HPV31	L2	11	166
HPV31	L1	10	57	HPV31	L2	9	126
HPV31	L1	9	187	HPV31	L2	10	126
HPV31	L1	10	187	HPV31	L2	8	91
HPV31	L1	10	410	HPV31	L2	11	91
HPV31	L1	8	14	HPV31	L2	11	284
HPV31	L1	9	14	HPV31	L2	8	216
HPV31	L1	11	478	HPV31	L2	11	216
HPV31	L1	8	5	HPV31	L2	9	90
HPV31	L1	9	5	HPV31	L2	8	78
HPV31	L1	8	174	HPV31	L2	10	78
HPV31	L1	8	182	HPV31	L2	11	372
HPV31	L1	10	182	HPV31	L2	9	168
HPV31	L1	11	409	HPV31	L2	10	168
HPV31	L1	11	295	HPV31	L2	11	168
HPV31	L1	9	63	HPV31	L2	10	141
HPV31	L1	11	63	HPV31	L2	10	209
HPV31	L1	9	221	HPV31	L2	8	427
HPV31	L1	8	232	HPV31	L2	10	409
HPV31	L1	9	232	HPV31	L2	11	409
HPV31	L2	9	271	HPV31	L2	9	393
HPV31	L2	10	271	HPV31	L2	11	393
HPV31	L2	11	271	HPV31	L2	10	73
HPV31	L2	8	240	HPV31	L2	9	387
HPV31	L2	8	414	HPV33	E1	8	3
HPV31	L2	10	414	HPV33	E1	10	3
HPV31	L2	11	414	HPV33	E1	11	301
HPV31	L2	9	424	HPV33	E1	11	585
HPV31	L2	10	424	HPV33	E1	11	585
HPV31	L2	11	424	HPV33	E1	9	470
HPV31	L2	9	28	HPV33	E1	10	470
HPV31	L2	8	273	HPV33	E1	8	293
HPV31	L2	9	273	HPV33	E1	8	460
HPV31	L2	10	273	HPV33	E1	9	460
HPV31	L2	8	102	HPV33	E1	11	592
HPV31	L2	11	160	HPV33	E1	10	302

Table XI
HLA-B7 Supermotif Peptides

HPV33	E1	11	302	HPV33	L1	11	180
HPV33	E1	11	553	HPV33	L1	10	483
HPV33	E1	8	504	HPV33	L1	10	185
HPV33	E1	10	504	HPV33	L1	11	185
HPV33	E1	11	504	HPV33	L1	8	438
HPV33	E1	9	433	HPV33	L1	9	438
HPV33	E1	8	237	HPV33	L1	11	438
HPV33	E1	10	237	HPV33	L1	8	240
HPV33	E1	11	237	HPV33	L1	9	240
HPV33	E1	8	329	HPV33	L1	10	240
HPV33	E1	10	329	HPV33	L1	11	240
HPV33	E1	11	329	HPV33	L1	8	461
HPV33	E1	8	518	HPV33	L1	9	461
HPV33	E1	11	518	HPV33	L1	11	461
HPV33	E1	8	569	HPV33	L1	8	292
HPV33	E1	10	569	HPV33	L1	9	292
HPV33	E1	11	569	HPV33	L1	8	476
HPV33	E2	10	195	HPV33	L1	8	163
HPV33	E2	9	247	HPV33	L1	8	309
HPV33	E2	11	340	HPV33	L1	9	78
HPV33	E2	10	294	HPV33	L1	9	13
HPV33	E2	8	26	HPV33	L1	10	13
HPV33	E2	10	26	HPV33	L1	8	394
HPV33	E2	11	26	HPV33	L1	10	394
HPV33	E2	10	341	HPV33	L1	8	93
HPV33	E2	11	341	HPV33	L1	9	93
HPV33	E2	9	238	HPV33	L1	10	93
HPV33	E2	9	229	HPV33	L1	8	54
HPV33	E2	11	59	HPV33	L1	9	54
HPV33	E5	8	59	HPV33	L1	10	54
HPV33	E5	10	59	HPV33	L1	9	432
HPV33	E5	10	20	HPV33	L1	9	186
HPV33	E5	11	20	HPV33	L1	10	186
HPV33	E5	9	45	HPV33	L1	11	407
HPV33	E5	10	45	HPV33	L1	10	408
HPV33	E5	11	45	HPV33	L1	11	164
HPV33	E6	9	111	HPV33	L1	8	14
HPV33	E6	11	111	HPV33	L1	9	14
HPV33	E6	8	94	HPV33	L1	10	139
HPV33	E6	11	94	HPV33	L1	8	5
HPV33	E6	8	35	HPV33	L1	9	5
HPV33	E6	9	35	HPV33	L1	8	406
HPV33	E6	11	35	HPV33	L1	9	63
HPV33	E6	8	8	HPV33	L1	11	63
HPV33	E6	11	8	HPV33	L1	10	431
HPV33	E6	8	58	HPV33	L2	9	173
HPV33	E6	10	58	HPV33	L2	10	173
HPV33	E7	8	18	HPV33	L2	11	173
HPV33	E7	11	18	HPV33	L2	9	276
HPV33	E7	8	5	HPV33	L2	10	276
HPV33	E7	9	5	HPV33	L2	11	276
HPV33	E7	11	5	HPV33	L2	10	120
HPV33	E7	8	46	HPV33	L2	9	27
HPV33	E7	9	46	HPV33	L2	11	239
HPV33	E7	10	46	HPV33	L2	8	278
HPV33	E7	9	40	HPV33	L2	9	278
HPV33	E7	11	40	HPV33	L2	10	278
HPV33	E7	8	16	HPV33	L2	8	261
HPV33	E7	10	16	HPV33	L2	9	77
HPV33	L1	9	180	HPV33	L2	9	165

Table XI
HLA-B7 Supermotif Peptides

HPV33	L2	11	165	HPV33	L2	11	338
HPV33	L2	8	428	HPV45	E1	10	552
HPV33	L2	11	428	HPV45	E1	8	562
HPV33	L2	8	415	HPV45	E1	10	562
HPV33	L2	10	415	HPV45	E1	11	562
HPV33	L2	8	456	HPV45	E1	9	179
HPV33	L2	10	456	HPV45	E1	8	504
HPV33	L2	11	456	HPV45	E1	9	504
HPV33	L2	8	407	HPV45	E1	10	504
HPV33	L2	9	407	HPV45	E1	11	504
HPV33	L2	8	98	HPV45	E1	9	301
HPV33	L2	10	98	HPV45	E1	10	301
HPV33	L2	11	98	HPV45	E1	11	301
HPV33	L2	8	170	HPV45	E1	10	585
HPV33	L2	8	216	HPV45	E1	11	585
HPV33	L2	10	216	HPV45	E1	9	470
HPV33	L2	9	32	HPV45	E1	10	470
HPV33	L2	10	32	HPV45	E1	9	627
HPV33	L2	11	394	HPV45	E1	9	249
HPV33	L2	10	83	HPV45	E1	11	545
HPV33	L2	8	196	HPV45	E1	8	237
HPV33	L2	9	123	HPV45	E1	11	237
HPV33	L2	9	160	HPV45	E1	11	592
HPV33	L2	10	160	HPV45	E1	9	553
HPV33	L2	11	171	HPV45	E1	9	302
HPV33	L2	8	28	HPV45	E1	8	302
HPV33	L2	8	78	HPV45	E1	10	302
HPV33	L2	11	78	HPV45	E1	11	302
HPV33	L2	8	90	HPV45	E1	9	433
HPV33	L2	11	90	HPV45	E1	9	97
HPV33	L2	9	86	HPV45	E1	9	110
HPV33	L2	11	346	HPV45	E1	8	329
HPV33	L2	11	289	HPV45	E1	10	329
HPV33	L2	9	89	HPV45	E1	11	329
HPV33	L2	8	220	HPV45	E1	8	460
HPV33	L2	9	220	HPV45	E1	9	460
HPV33	L2	8	274	HPV45	E1	10	460
HPV33	L2	9	274	HPV45	E1	8	293
HPV33	L2	11	274	HPV45	E1	8	569
HPV33	L2	9	425	HPV45	E1	10	569
HPV33	L2	10	425	HPV45	E1	11	569
HPV33	L2	11	425	HPV45	E2	9	355
HPV33	L2	9	419	HPV45	E2	11	355
HPV33	L2	10	419	HPV45	E2	8	240
HPV33	L2	8	245	HPV45	E2	10	66
HPV33	L2	10	329	HPV45	E2	10	5
HPV33	L2	10	412	HPV45	E2	10	238
HPV33	L2	11	412	HPV45	E2	11	65
HPV33	L2	9	185	HPV45	E6	9	6
HPV33	L2	10	138	HPV45	E6	8	14
HPV33	L2	9	214	HPV45	E6	9	113
HPV33	L2	10	214	HPV45	E6	8	10
HPV33	L2	10	375	HPV45	E7	8	22
HPV33	L2	11	375	HPV45	E7	11	22
HPV33	L2	11	125	HPV45	E7	9	16
HPV33	L2	9	402	HPV45	E7	11	16
HPV33	L2	10	72	HPV45	E7	8	56
HPV33	L2	11	72	HPV45	E7	10	56
HPV33	L2	9	422	HPV45	E7	9	3
HPV33	L2	8	338	HPV45	E7	10	3

335

Table XI
HLA-B7 Supermotif Peptides

HPV45 E7	11	3		HPV45 L2	11	208
HPV45 L1	10	212		HPV45 L2	9	257
HPV45 L1	11	212		HPV45 L2	11	266
HPV45 L1	8	386		HPV45 L2	10	94
HPV45 L1	8	469		HPV45 L2	11	94
HPV45 L1	9	469		HPV45 L2	8	445
HPV45 L1	11	469		HPV45 L2	10	445
HPV45 L1	8	267		HPV45 L2	11	445
HPV45 L1	9	267		HPV45 L2	8	223
HPV45 L1	11	267		HPV45 L2	8	97
HPV45 L1	8	21		HPV45 L2	10	97
HPV45 L1	9	21		HPV45 L2	11	97
HPV45 L1	10	21		HPV45 L2	8	85
HPV45 L1	8	511		HPV45 L2	9	85
HPV45 L1	8	338		HPV45 L2	8	244
HPV45 L1	9	104		HPV45 L2	9	452
HPV45 L1	9	39		HPV45 L2	10	452
HPV45 L1	10	39		HPV45 L2	11	452
HPV45 L1	8	119		HPV45 L2	8	408
HPV45 L1	9	119		HPV45 L2	9	377
HPV45 L1	10	119		HPV45 L2	9	159
HPV45 L1	11	73		HPV45 L2	10	159
HPV45 L1	8	464		HPV45 L2	11	253
HPV45 L1	11	464		HPV45 L2	10	355
HPV45 L1	9	213		HPV45 L2	8	28
HPV45 L1	10	213		HPV45 L2	11	354
HPV45 L1	8	437		HPV45 L2	8	89
HPV45 L1	9	437		HPV45 L2	11	284
HPV45 L1	8	40		HPV45 L2	9	88
HPV45 L1	9	40		HPV45 L2	9	324
HPV45 L1	8	438		HPV45 L2	11	324
HPV45 L1	11	438		HPV45 L2	10	419
HPV45 L1	8	41		HPV45 L2	11	419
HPV45 L1	10	439		HPV45 L2	11	137
HPV45 L1	8	208		HPV45 L2	9	213
HPV45 L1	10	208		HPV45 L2	9	360
HPV45 L1	9	515		HPV45 L2	11	360
HPV45 L1	8	525		HPV45 L2	9	184
HPV45 L1	8	31		HPV45 L2	9	144
HPV45 L1	9	31		HPV45 L2	9	271
HPV45 L1	11	507		HPV45 L2	10	271
HPV45 L1	8	321		HPV45 L2	9	398
HPV45 L1	9	463		HPV45 L2	10	398
HPV45 L1	8	189		HPV45 L2	11	398
HPV45 L1	9	189		HPV45 L2	10	72
HPV45 L1	9	89		HPV45 L2	11	72
HPV45 L1	11	89		HPV45 L2	9	390
HPV45 L1	9	247		HPV45 L2	11	390
HPV45 L1	10	381		HPV45 L2	11	170
HPV45 L1	9	436		HPV45 L2	10	119
HPV45 L1	10	436		HPV45 L2	9	415
HPV45 L1	10	79		HPV45 L2	8	370
HPV45 L1	11	79		HPV56 E2	11	138
HPV45 L1	9	258		HPV56 E2	10	243
HPV45 L1	8	492		HPV56 E2	9	229
HPV45 L1	9	492		HPV56 E2	10	229
HPV45 L1	11	492		HPV56 E2	8	300
HPV45 L2	9	27		HPV56 E2	9	300
HPV45 L2	8	100		HPV56 E2	8	182
HPV45 L2	8	208		HPV56 E2	9	186

Table XI
HLA-B7 Supermotif Peptides

HPV56	E2	9	151		HPV56	L1	11	465
HPV56	E2	9	2		HPV56	L1	8	40
HPV56	E2	11	2		HPV56	L1	9	40
HPV56	E6	8	61		HPV56	L1	8	440
HPV56	E6	10	61		HPV56	L1	8	196
HPV56	E6	11	61		HPV56	L1	8	227
HPV56	E6	8	24		HPV56	L1	9	227
HPV56	E6	11	24		HPV56	L1	11	328
HPV56	E6	9	7		HPV56	L1	8	51
HPV56	E6	8	11		HPV56	L1	9	265
HPV56	E6	11	11		HPV56	L1	10	265
HPV56	E6	10	111		HPV56	L2	9	271
HPV56	E7	8	46		HPV56	L2	10	271
HPV56	E7	8	16		HPV56	L2	11	271
HPV56	E7	8	63		HPV56	L2	9	358
HPV56	E7	9	63		HPV56	L2	10	358
HPV56	E7	10	63		HPV56	L2	11	391
HPV56	E7	8	5		HPV56	L2	11	170
HPV56	E7	9	5		HPV56	L2	8	223
HPV56	E7	11	5		HPV56	L2	9	223
HPV56	L1	9	521		HPV56	L2	9	27
HPV56	L1	11	219		HPV56	L2	9	238
HPV56	L1	8	472		HPV56	L2	11	238
HPV56	L1	9	472		HPV56	L2	8	273
HPV56	L1	11	472		HPV56	L2	9	273
HPV56	L1	8	11		HPV56	L2	10	273
HPV56	L1	10	11		HPV56	L2	8	100
HPV56	L1	11	11		HPV56	L2	8	208
HPV56	L1	8	318		HPV56	L2	11	208
HPV56	L1	9	318		HPV56	L2	8	412
HPV56	L1	10	318		HPV56	L2	8	97
HPV56	L1	8	30		HPV56	L2	10	97
HPV56	L1	10	30		HPV56	L2	11	97
HPV56	L1	8	495		HPV56	L2	8	215
HPV56	L1	9	495		HPV56	L2	9	215
HPV56	L1	11	495		HPV56	L2	8	195
HPV56	L1	9	96		HPV56	L2	10	119
HPV56	L1	11	96		HPV56	L2	10	453
HPV56	L1	8	343		HPV56	L2	11	453
HPV56	L1	9	111		HPV56	L2	8	376
HPV56	L1	9	48		HPV56	L2	8	373
HPV56	L1	10	48		HPV56	L2	10	373
HPV56	L1	11	48		HPV56	L2	11	373
HPV56	L1	8	126		HPV56	L2	8	409
HPV56	L1	9	126		HPV56	L2	10	409
HPV56	L1	10	126		HPV56	L2	11	409
HPV56	L1	10	220		HPV56	L2	11	253
HPV56	L1	9	12		HPV56	L2	9	159
HPV56	L1	10	12		HPV56	L2	10	159
HPV56	L1	11	12		HPV56	L2	8	89
HPV56	L1	8	319		HPV56	L2	10	335
HPV56	L1	9	319		HPV56	L2	11	284
HPV56	L1	8	320		HPV56	L2	8	244
HPV56	L1	9	466		HPV56	L2	9	88
HPV56	L1	10	466		HPV56	L2	8	77
HPV56	L1	8	49		HPV56	L2	11	77
HPV56	L1	9	49		HPV56	L2	9	324
HPV56	L1	10	49		HPV56	L2	11	324
HPV56	L1	11	441		HPV56	L2	11	266
HPV56	L1	10	465		HPV56	L2	9	422

Table XI
HLA-B7 Supermotif Peptides

HPV56	L2	10	422
HPV56	L2	11	422
HPV56	L2	8	85
HPV56	L2	9	85
HPV56	L2	9	399
HPV56	L2	10	399
HPV56	L2	11	399
HPV56	L2	9	213
HPV56	L2	10	213
HPV56	L2	11	213
HPV56	L2	8	368
HPV56	L2	9	184
HPV56	L2	9	144
HPV56	L2	10	72
HPV56	L2	11	72
HPV56	L2	8	419
HPV56	L2	9	416
HPV56	L2	11	416

Table XI A. HPV 6A
HLA-B7 Supermotif Peptides

2	3	4
L2	9	271
L2	10	271
L2	8	118
E1	10	337
E1	11	337
E2	8	326
E2	10	326
L2	10	410
L1	8	158
E4	11	39
L2	8	217
L2	9	217
L2	8	98
L2	10	98
L2	11	98
L2	9	182
E1	10	181
E5	9	77
E5	10	77
E5	11	77
L2	9	27
L1	10	181
L1	11	181
E1	10	560
L2	11	236
L2	8	101
L1	8	89
L1	9	89
L1	10	89
E7	8	19
E7	11	19
L1	8	236
L1	9	236
L1	10	236
L1	11	236
L1	8	434
L1	9	434
L1	11	434
L2	11	354
E1	9	257
E1	11	257
E1	9	309
E1	10	309
E1	11	309
L2	11	162
L2	10	95
L2	11	95
L1	8	265
L1	9	265
E2	10	90
E1	9	593
E1	10	593
E1	11	593
L2	10	407
L2	9	402
L2	11	402
L2	8	85
L2	9	85
L2	10	85

E1	9	478
E1	10	478
L2	8	206
E2	10	257
E2	11	257
L2	10	425
L2	11	425
L1	10	117
L2	8	188
L2	11	188
L2	11	336
L2	10	362
L2	11	362
L1	9	46
E1	8	301
E2	10	208
E1	9	455
E1	10	455
E1	11	455
L2	9	32
L2	10	32
L2	8	193
L2	8	450
L2	9	450
L2	10	450
E2	9	352
E2	11	352
L1	8	432
L1	10	432
L1	11	432
E6	9	109
L2	9	79
L2	10	79
L1	8	305
L1	8	74
L1	9	74
L2	8	422
E5	8	18
E5	9	18
E5	11	18
E1	11	591
L1	8	134
L1	10	134
E1	11	544
L1	8	390
L1	10	390
L2	10	358
L2	9	157
L1	8	15
L1	11	15
L2	9	251
L2	11	251
L2	9	123
E7	10	17
E1	8	479
E1	9	479
E1	11	479
L2	8	28
E4	8	28
E1	8	310

Table XI A. HPV 6A
HLA-B7 Supermotif Peptides

E1	9	310		E1	10	93
E1	10	310		E2	9	323
E1	11	310		E2	10	323
L1	9	182		E2	11	323
L1	10	182		L1	8	402
E2	8	60		E1	9	107
E1	9	561		L2	11	417
E1	11	561		E1	10	89
L1	10	404		E1	11	89
L1	8	13		L2	9	138
L1	9	13		E2	9	215
L1	10	13		E4	8	62
E4	8	32		E4	11	62
L1	11	403		L1	10	427
L1	9	12		L2	8	414
L1	10	12		L2	9	414
L1	11	12		E1	8	463
E2	9	235		E1	9	468
E2	8	353		E1	10	468
E2	10	353		E5	8	63
E2	11	353		E5	10	63
L2	9	170		E5	11	63
L2	10	170		L2	9	375
L2	11	170		E4	9	27
L2	8	90		E2	10	234
L2	9	90		L2	8	242
E1	10	527		L1	11	290
E1	11	527		L1	11	174
E1	9	118		E2	11	221
E1	10	118		L2	10	213
E7	9	46		E1	9	641
E7	10	46		L1	9	59
E1	8	512		L1	11	59
E1	9	512		L2	11	72
E1	10	512		L2	10	388
E1	11	512		L2	11	388
E7	8	16		L2	8	122
E7	11	16		L2	10	122
L2	10	169		E2	9	59
L2	11	169		L1	10	11
L2	8	167		L1	11	11
L2	8	381		E4	9	66
L2	10	381		L1	8	227
L2	10	284		L1	9	227
L2	11	284		L1	8	457
L1	9	481		L1	9	457
L1	10	481		E6	10	59
E1	11	225		SF 1168107 v1		
E4	9	31				
L2	9	89				
L2	10	89				
L2	10	219				
L2	11	219				
L1	8	3				
L1	9	3				
E2	8	246				
E2	9	246				
E2	11	246				
L2	10	324				
E1	9	93				

WO 01/41799   PCT/US00/33549

Table XI B. HPV 6B
HLA-B7 Supermotif Peptides

2	3	4		2	3	4
L2	9	271		L2	9	401
L2	10	271		L2	11	401
L2	8	118		L2	8	85
E1	10	337		L2	9	85
E1	11	337		L2	10	85
E2	8	326		E1	9	478
E2	10	326		E1	10	478
L2	10	409		L2	8	206
E4	8	3		E2	10	257
E4	9	3		E2	11	257
E4	10	3		L2	10	425
E4	11	3		L2	11	425
L1	8	158		L1	10	117
E4	11	49		L2	8	188
L2	8	217		L2	11	188
L2	9	217		L2	11	336
L2	8	98		L2	10	362
L2	10	98		L2	11	362
L2	11	98		L1	9	46
E1	10	181		E1	8	301
L2	9	182		E2	10	208
E5A	8	77		E1	9	455
E5A	9	77		E1	10	455
E5A	10	77		E1	11	455
E5A	11	77		L2	9	32
L2	9	27		L2	10	32
L1	10	181		L2	8	193
L1	11	181		L2	8	450
E1	10	560		L2	9	450
L2	11	236		L2	10	450
L2	8	101		E2	9	352
L1	8	89		E2	11	352
L1	9	89		L1	8	432
L1	10	89		L1	10	432
E7	8	19		L1	11	432
E7	11	19		E6	9	109
L1	8	236		L2	9	79
L1	9	236		L2	10	79
L1	10	236		L1	8	305
L1	11	236		L1	8	74
L1	8	434		L1	9	74
L1	9	434		L2	8	422
L1	11	434		E5A	8	18
L2	11	354		E5A	9	18
E1	9	257		E5A	11	18
E1	11	257		E1	11	591
E1	9	309		L1	8	134
E1	10	309		L1	10	134
E1	11	309		E1	11	544
L2	11	162		L1	8	390
L2	10	95		L1	10	390
L2	11	95		L2	10	358
L1	8	265		L2	9	157
L1	9	265		L1	8	15
E2	10	90		L1	11	15
E1	9	593		L2	9	251
E1	10	593		L2	11	251
E1	11	593		L2	9	123
L2	10	406		E7	10	17
				E1	8	479

Table XI B. HPV 6B
HLA-B7 Supermotif Peptides

E1	9	479		E2	8	246
E1	11	479		E2	9	246
L2	8	28		E2	11	246
E4	8	38		L2	10	324
E1	8	310		E1	9	93
E1	9	310		E1	10	93
E1	10	310		E4	8	68
E1	11	310		E4	9	68
L1	9	182		L1	8	402
L1	10	182		E1	9	107
E2	8	60		E1	10	89
E1	9	561		E1	11	89
E1	11	561		L2	9	138
L1	10	404		L2	9	419
L1	8	13		L2	10	419
L1	9	13		L2	11	419
L1	10	13		E2	8	215
E4	8	42		E2	9	215
L1	11	403		E4	8	72
L1	9	12		E4	11	72
L1	10	12		L1	10	427
L1	11	12		L2	9	413
E2	9	235		L2	10	413
E2	8	353		E1	8	468
E2	10	353		E1	9	468
E2	11	353		E1	10	468
L2	9	170		E5A	8	63
L2	10	170		E5A	10	63
L2	11	170		E5A	11	63
L2	8	90		L2	9	375
L2	9	90		E4	9	37
E1	10	527		E2	10	234
E1	11	527		L2	8	242
E1	9	118		L1	11	290
E1	10	118		L1	11	174
E7	9	46		L2	10	213
E7	10	46		E1	9	641
E1	8	512		L1	9	59
E1	9	512		L1	11	59
E1	10	512		L2	11	72
E1	11	512		L2	9	388
E7	8	16		L2	10	388
E7	11	16		L2	11	388
L2	10	169		L2	8	122
L2	11	169		L2	10	122
L2	8	167		E2	9	59
L2	8	381		L1	10	11
L2	10	381		L1	11	11
L2	10	284		E4	9	76
L2	11	284		L1	8	227
L1	9	481		L1	9	227
L1	10	481		L1	8	457
E1	11	225		L1	9	457
E4	9	41		E6	10	59
L2	9	89				
L2	10	89				
L2	10	219				
L2	11	219				
L1	8	3				
L1	9	3				

Table XI C. HPV11
HLA-B7 Supermotif Peptides

2	3	4				
L2	9	270		L2	10	84
L2	10	270		L2	9	397
E1	10	337		L2	11	397
E1	11	337		E1	10	478
E2	8	325		B2	8	243
E2	10	325		E2	10	243
L1	8	159		E2	11	243
E4	11	50		L2	8	205
L2	8	97		L2	11	205
L2	10	97		L2	10	421
L2	11	97		L2	11	421
L2	9	181		L1	10	117
E4	9	47		L2	11	335
L2	9	26		L1	9	46
L1	10	182		L2	9	355
L1	11	182		E1	8	301
E1	10	560		E1	9	455
L2	11	235		E1	10	455
L2	11	353		E1	11	455
L2	8	100		L2	9	31
L1	8	89		L2	10	31
L1	9	89		L2	8	192
L1	10	89		L2	8	446
E7	8	19		L2	9	446
E7	11	19		L2	10	446
L2	11	357		L2	10	71
L1	8	237		L2	11	71
L1	9	237		E2	9	351
L1	10	237		E2	11	351
L1	11	237		L2	9	78
L1	8	435		L2	10	78
L1	9	435		E6	9	109
L1	11	435		L2	10	2
L2	10	350		L1	8	306
E1	9	257		L1	8	74
E1	11	257		L1	9	74
E1	9	309		L2	10	212
E1	11	309		L2	8	418
L2	11	161		E5	8	18
E2	8	210		E5	9	18
L2	10	94		E5	11	18
L2	11	94		E1	11	591
L1	8	266		L1	8	135
L1	9	266		L1	10	135
E2	10	90		L2	9	156
E5	8	77		L2	10	156
E5	9	77		E1	11	544
E5	10	77		L1	8	391
E5	11	77		L1	10	391
E6	10	59		L1	8	15
E1	9	593		L1	11	15
E1	10	593		L2	9	250
E1	11	593		L2	11	250
L1	8	458		E4	8	48
L1	9	458		E7	10	17
L2	8	216		E1	9	479
L2	9	216		E1	11	479
L2	10	402		L2	8	27
L2	8	84		E4	8	38
L2	9	84		E1	8	310
				E1	10	310

Table XI C HPV11
HLA-B7 Supermotif Peptides

E1	11	310		L2	10	323
L1	9	183		E1	10	89
L1	10	183		E1	11	89
E1	9	561		L2	9	137
E1	11	561		L2	9	415
E4	8	43		L2	10	415
L1	10	405		L2	11	415
L1	8	13		E2	10	215
L1	9	13		E4	11	71
L1	10	13		L1	10	428
E4	9	42		L2	9	409
L1	11	404		L2	10	409
L1	9	12		E1	8	468
L1	10	12		E1	9	468
L1	11	12		E1	10	468
E2	8	352		E5	8	63
E2	10	352		E5	10	63
E2	11	352		L2	9	371
L2	9	122		E4	9	37
L2	9	169		L2	8	241
L2	10	169		L1	11	291
L2	11	169		E1	9	641
L2	8	89		E4	8	3
L2	9	89		E4	9	3
E1	10	527		E4	10	3
E1	11	527		E4	11	3
E1	9	118		L1	9	59
E1	10	118		L1	11	59
E1	8	512		L1	9	217
E1	9	512		L2	9	384
E1	10	512		L2	10	384
E1	11	512		L2	11	384
E7	9	46		L1	10	11
E7	10	46		L1	11	11
E7	8	16		L2	8	121
E7	11	16		L2	10	121
L2	10	168		E5	8	4
L2	11	168		E4	9	75
L2	8	166		L1	8	228
L2	10	283		L1	9	228
L2	11	283				
L1	10	482				
E1	11	225				
E4	8	67				
E4	9	67				
E4	10	41				
L2	9	88				
L2	10	88				
L2	10	218				
L2	11	218				
L1	8	3				
L1	9	3				
E2	9	195				
E2	9	322				
E2	10	322				
E2	11	322				
E1	9	93				
E1	10	93				
L2	11	76				
L1	8	403				
E1	9	107				

Table XII
HLA-B27 Supermotif Peptides

1	2	3	4
HPV16	E1	10	67
HPV16	E1	9	203
HPV16	E1	9	209
HPV16	E1	11	209
HPV16	E1	9	516
HPV16	E1	11	516
HPV16	E1	8	399
HPV16	E1	10	399
HPV16	E1	8	76
HPV16	E1	10	76
HPV16	E1	11	76
HPV16	E1	9	627
HPV16	E1	8	606
HPV16	E1	9	431
HPV16	E1	10	416
HPV16	E1	11	416
HPV16	E1	8	26
HPV16	E1	8	291
HPV16	E1	10	291
HPV16	E1	11	116
HPV16	E1	10	182
HPV16	E1	9	211
HPV16	E1	11	226
HPV16	E1	10	284
HPV16	E1	11	284
HPV16	E1	9	482
HPV16	E1	10	482
HPV16	E1	8	79
HPV16	E1	8	251
HPV16	E1	10	251
HPV16	E1	11	251
HPV16	E1	8	426
HPV16	E1	8	550
HPV16	E1	8	469
HPV16	E1	10	469
HPV16	E1	11	469
HPV16	E1	9	417
HPV16	E1	10	417
HPV16	E1	8	413
HPV16	E1	10	413
HPV16	E1	9	87
HPV16	E1	10	262
HPV16	E1	8	579
HPV16	E1	10	579
HPV16	E1	8	557
HPV16	E1	8	460
HPV16	E1	10	86
HPV16	E1	9	393
HPV16	E1	10	393
HPV16	E1	8	198
HPV16	E1	9	198
HPV16	E1	10	198
HPV16	E1	11	198
HPV16	E1	9	536
HPV16	E1	10	536
HPV16	E1	8	312
HPV16	E1	9	312
HPV16	E1	10	312
HPV16	E1	11	312
HPV16	E1	8	446
HPV16	E1	9	446
HPV16	E1	11	446
HPV16	E1	8	491
HPV16	E1	9	491
HPV16	E1	11	491
HPV16	E1	8	229
HPV16	E1	10	229
HPV16	E1	11	229
HPV16	E1	8	286
HPV16	E1	9	286
HPV16	E1	8	581
HPV16	E1	8	468
HPV16	E1	9	468
HPV16	E1	11	468
HPV16	E1	8	310
HPV16	E1	9	310
HPV16	E1	10	310
HPV16	E1	11	310
HPV16	E1	8	108
HPV16	E1	8	78
HPV16	E1	9	78
HPV16	E1	9	347
HPV16	E1	11	347
HPV16	E1	10	341
HPV16	E1	11	150
HPV16	E1	9	183
HPV16	E1	11	410
HPV16	E1	8	88
HPV16	E1	11	88
HPV16	E1	11	124
HPV16	E1	8	506
HPV16	E1	9	506
HPV16	E1	11	506
HPV16	E1	9	295
HPV16	E1	11	295
HPV16	E1	10	504
HPV16	E1	11	504
HPV16	E1	8	119
HPV16	E1	9	119
HPV16	E1	9	614
HPV16	E1	10	574
HPV16	E1	11	574
HPV16	E1	11	402
HPV16	E1	9	549
HPV16	E1	8	439
HPV16	E1	10	439
HPV16	E1	9	609
HPV16	E1	10	281
HPV16	E1	9	412
HPV16	E1	11	412
HPV16	E1	8	322
HPV16	E1	11	322
HPV16	E2	9	46
HPV16	E2	9	28
HPV16	E2	11	28
HPV16	E2	8	90
HPV16	E2	10	90
HPV16	E2	8	176
HPV16	E2	9	176

Table XII
HLA-B27 Supermotif Peptides

HPV16	E2	11	176	HPV16	E2	8	213
HPV16	E2	8	171	HPV16	E2	9	213
HPV16	E2	8	51	HPV16	E2	9	342
HPV16	E2	9	51	HPV16	E2	11	342
HPV16	E2	8	305	HPV16	E2	10	6
HPV16	E2	10	305	HPV16	E2	11	6
HPV16	E2	11	305	HPV16	E2	8	65
HPV16	E2	9	323	HPV16	E2	9	65
HPV16	E2	10	323	HPV16	E2	11	65
HPV16	E2	11	323	HPV16	E2	8	179
HPV16	E2	8	328	HPV16	E2	10	179
HPV16	E2	10	328	HPV16	E2	9	135
HPV16	E2	8	258	HPV16	E2	11	135
HPV16	E2	10	258	HPV16	E2	8	222
HPV16	E2	11	258	HPV16	E2	10	17
HPV16	E2	8	110	HPV16	E2	9	254
HPV16	E2	10	110	HPV16	E2	8	186
HPV16	E2	10	211	HPV16	E2	9	186
HPV16	E2	11	211	HPV16	E2	8	160
HPV16	E2	8	164	HPV16	E2	9	160
HPV16	E2	8	307	HPV16	E2	10	160
HPV16	E2	9	307	HPV16	E2	10	289
HPV16	E2	8	112	HPV16	E2	8	326
HPV16	E2	10	112	HPV16	E2	10	326
HPV16	E2	8	52	HPV16	E2	9	350
HPV16	E2	11	52	HPV16	E2	8	319
HPV16	E2	9	327	HPV16	E2	9	33
HPV16	E2	11	327	HPV16	E2	10	33
HPV16	E2	8	34	HPV16	E2	11	33
HPV16	E2	9	34	HPV16	E2	8	44
HPV16	E2	10	34	HPV16	E2	11	44
HPV16	E2	11	34	HPV16	E2	9	303
HPV16	E2	9	306	HPV16	E2	10	303
HPV16	E2	10	306	HPV16	E5	8	57
HPV16	E2	9	111	HPV16	E5	9	57
HPV16	E2	11	111	HPV16	E5	10	57
HPV16	E2	9	257	HPV16	E5	11	57
HPV16	E2	11	257	HPV16	E5	8	74
HPV16	E2	8	298	HPV16	E5	9	74
HPV16	E2	8	291	HPV16	E5	8	29
HPV16	E2	11	291	HPV16	E5	11	29
HPV16	E2	8	26	HPV16	E6	10	40
HPV16	E2	11	26	HPV16	E6	11	40
HPV16	E2	11	301	HPV16	E6	10	71
HPV16	E2	9	129	HPV16	E6	9	127
HPV16	E2	10	129	HPV16	E6	9	14
HPV16	E2	11	129	HPV16	E6	8	132
HPV16	E2	8	36	HPV16	E6	8	54
HPV16	E2	9	36	HPV16	E6	8	137
HPV16	E2	11	36	HPV16	E6	9	30
HPV16	E2	10	217	HPV16	E6	10	30
HPV16	E2	11	217	HPV16	E6	10	108
HPV16	E2	8	55	HPV16	E6	10	135
HPV16	E2	9	55	HPV16	E6	8	128
HPV16	E2	10	55	HPV16	E6	10	74
HPV16	E2	9	67	HPV16	E6	8	45
HPV16	E2	11	67	HPV16	E6	9	45
HPV16	E2	8	181	HPV16	E6	10	45
HPV16	E2	10	353	HPV16	E6	8	1
HPV16	E2	11	353	HPV16	E6	9	1

Table XII
HLA-B27 Supermotif Peptides

HPV16 E6	8	100		HPV16 L1	8	79
HPV16 E6	9	100		HPV16 L1	9	79
HPV16 E6	11	16		HPV16 L1	10	79
HPV16 E6	10	130		HPV16 L1	8	468
HPV16 E6	10	123		HPV16 L1	10	468
HPV16 E6	9	124		HPV16 L1	9	500
HPV16 E6	8	84		HPV16 L1	9	477
HPV16 E6	10	17		HPV16 L1	9	467
HPV16 E6	8	46		HPV16 L1	11	467
HPV16 E6	9	46		HPV16 L1	9	390
HPV16 E6	9	78		HPV16 L1	11	390
HPV16 E6	11	78		HPV16 L1	8	276
HPV16 E6	9	150		HPV16 L1	11	276
HPV16 E6	8	61		HPV16 L1	10	107
HPV16 E6	9	61		HPV16 L1	11	107
HPV16 E6	8	83		HPV16 L1	8	84
HPV16 E6	9	83		HPV16 L1	11	84
HPV16 E7	8	50		HPV16 L1	9	150
HPV16 E7	9	59		HPV16 L1	11	150
HPV16 E7	11	59		HPV16 L1	9	334
HPV16 E7	8	48		HPV16 L1	9	242
HPV16 E7	10	48		HPV16 L1	10	288
HPV16 E7	8	76		HPV16 L1	9	169
HPV16 E7	9	76		HPV16 L1	9	462
HPV16 E7	8	8		HPV16 L1	11	462
HPV16 E7	10	65		HPV16 L1	10	504
HPV16 E7	8	1		HPV16 L1	8	89
HPV16 E7	11	1		HPV16 L1	10	89
HPV16 E7	8	72		HPV16 L1	11	89
HPV16 E7	11	72		HPV16 L1	10	340
HPV16 L1	8	524		HPV16 L1	8	122
HPV16 L1	9	55		HPV16 L1	10	122
HPV16 L1	9	405		HPV16 L1	8	391
HPV16 L1	10	405		HPV16 L1	10	391
HPV16 L1	9	187		HPV16 L1	11	391
HPV16 L1	9	255		HPV16 L1	9	284
HPV16 L1	10	255		HPV16 L1	10	284
HPV16 L1	10	479		HPV16 L1	9	492
HPV16 L1	11	386		HPV16 L1	11	492
HPV16 L1	11	99		HPV16 L1	10	277
HPV16 L1	8	344		HPV16 L1	11	277
HPV16 L1	8	145		HPV16 L1	9	45
HPV16 L1	9	196		HPV16 L1	10	45
HPV16 L1	10	196		HPV16 L1	11	45
HPV16 L1	11	196		HPV16 L1	10	66
HPV16 L1	8	134		HPV16 L1	11	66
HPV16 L1	10	134		HPV16 L1	8	363
HPV16 L1	8	491		HPV16 L1	10	363
HPV16 L1	10	491		HPV16 L1	11	363
HPV16 L1	9	101		HPV16 L1	8	283
HPV16 L1	11	101		HPV16 L1	10	283
HPV16 L1	8	417		HPV16 L1	11	283
HPV16 L1	9	417		HPV16 L1	8	61
HPV16 L1	8	303		HPV16 L1	9	61
HPV16 L1	10	303		HPV16 L1	10	61
HPV16 L1	11	303		HPV16 L1	11	61
HPV16 L1	9	78		HPV16 L1	9	21
HPV16 L1	10	78		HPV16 L1	10	21
HPV16 L1	11	78		HPV16 L1	11	21
HPV16 L1	8	261		HPV16 L1	9	381

Table XII
HLA-B27 Supermotif Peptides

HPV16	L1	10	381	HPV16	L2	11	314
HPV16	L1	8	177	HPV16	L2	10	324
HPV16	L1	9	177	HPV16	L2	8	235
HPV16	L1	8	444	HPV16	L2	9	235
HPV16	L1	9	444	HPV16	L2	10	89
HPV16	L1	10	444	HPV18	E1	10	269
HPV16	L1	8	96	HPV18	E1	8	578
HPV16	L2	9	7	HPV18	E1	9	578
HPV16	L2	9	322	HPV18	E1	8	298
HPV16	L2	11	22	HPV18	E1	10	298
HPV16	L2	10	179	HPV18	E1	8	125
HPV16	L2	8	317	HPV18	E1	8	406
HPV16	L2	10	317	HPV18	E1	10	406
HPV16	L2	11	317	HPV18	E1	8	276
HPV16	L2	8	38	HPV18	E1	9	276
HPV16	L2	9	38	HPV18	E1	10	276
HPV16	L2	11	38	HPV18	E1	11	276
HPV16	L2	8	68	HPV18	E1	8	25
HPV16	L2	11	3	HPV18	E1	8	602
HPV16	L2	8	11	HPV18	E1	10	602
HPV16	L2	9	11	HPV18	E1	8	613
HPV16	L2	10	460	HPV18	E1	8	236
HPV16	L2	8	457	HPV18	E1	9	236
HPV16	L2	9	457	HPV18	E1	11	236
HPV16	L2	10	457	HPV18	E1	8	555
HPV16	L2	10	4	HPV18	E1	10	555
HPV16	L2	8	8	HPV18	E1	9	101
HPV16	L2	11	8	HPV18	E1	9	621
HPV16	L2	8	448	HPV18	E1	10	70
HPV16	L2	8	455	HPV18	E1	9	218
HPV16	L2	10	455	HPV18	E1	11	233
HPV16	L2	11	455	HPV18	E1	8	258
HPV16	L2	9	312	HPV18	E1	9	258
HPV16	L2	11	312	HPV18	E1	10	258
HPV16	L2	8	34	HPV18	E1	11	258
HPV16	L2	9	34	HPV18	E1	8	291
HPV16	L2	8	459	HPV18	E1	11	291
HPV16	L2	11	459	HPV18	E1	9	489
HPV16	L2	9	456	HPV18	E1	10	489
HPV16	L2	10	456	HPV18	E1	8	498
HPV16	L2	11	456	HPV18	E1	9	498
HPV16	L2	8	458	HPV18	E1	11	498
HPV16	L2	9	458	HPV18	E1	9	575
HPV16	L2	10	297	HPV18	E1	11	575
HPV16	L2	9	353	HPV18	E1	8	433
HPV16	L2	9	304	HPV18	E1	8	557
HPV16	L2	9	219	HPV18	E1	11	417
HPV16	L2	10	219	HPV18	E1	8	123
HPV16	L2	8	296	HPV18	E1	10	123
HPV16	L2	11	296	HPV18	E1	11	476
HPV16	L2	9	229	HPV18	E1	9	424
HPV16	L2	10	229	HPV18	E1	10	424
HPV16	L2	9	190	HPV18	E1	8	629
HPV16	L2	10	247	HPV18	E1	8	82
HPV16	L2	11	247	HPV18	E1	9	82
HPV16	L2	9	10	HPV18	E1	8	305
HPV16	L2	10	10	HPV18	E1	9	305
HPV16	L2	10	77	HPV18	E1	10	305
HPV16	L2	11	77	HPV18	E1	8	564
HPV16	L2	9	314	HPV18	E1	11	409

Table XII
HLA-B27 Supermotif Peptides

HPV18 E1	10	471		HPV18 E2	11	73
HPV18 E1	11	471		HPV18 E2	9	237
HPV18 E1	9	400		HPV18 E2	10	237
HPV18 E1	10	400		HPV18 E2	9	50
HPV18 E1	9	205		HPV18 E2	10	21
HPV18 E1	10	205		HPV18 E2	10	311
HPV18 E1	11	205		HPV18 E2	8	295
HPV18 E1	10	648		HPV18 E2	10	295
HPV18 E1	8	319		HPV18 E2	11	52
HPV18 E1	9	319		HPV18 E2	8	256
HPV18 E1	10	319		HPV18 E2	11	256
HPV18 E1	11	319		HPV18 E2	8	328
HPV18 E1	10	286		HPV18 E2	10	328
HPV18 E1	8	453		HPV18 E2	9	181
HPV18 E1	9	453		HPV18 E2	11	181
HPV18 E1	11	453		HPV18 E2	10	10
HPV18 E1	10	543		HPV18 E2	11	10
HPV18 E1	8	209		HPV18 E2	8	114
HPV18 E1	9	209		HPV18 E2	10	114
HPV18 E1	10	209		HPV18 E2	11	114
HPV18 E1	10	581		HPV18 E2	8	176
HPV18 E1	8	475		HPV18 E2	8	74
HPV18 E1	8	317		HPV18 E2	9	74
HPV18 E1	9	317		HPV18 E2	10	74
HPV18 E1	10	317		HPV18 E2	11	159
HPV18 E1	11	317		HPV18 E2	10	290
HPV18 E1	8	111		HPV18 E2	8	40
HPV18 E1	9	354		HPV18 E2	9	40
HPV18 E1	11	354		HPV18 E2	10	40
HPV18 E1	8	122		HPV18 E2	11	40
HPV18 E1	9	122		HPV18 E2	9	308
HPV18 E1	11	122		HPV18 E2	9	115
HPV18 E1	10	423		HPV18 E2	10	115
HPV18 E1	11	423		HPV18 E2	11	115
HPV18 E1	10	348		HPV18 E2	8	299
HPV18 E1	9	556		HPV18 E2	8	292
HPV18 E1	8	420		HPV18 E2	11	292
HPV18 E1	10	420		HPV18 E2	8	306
HPV18 E1	11	127		HPV18 E2	11	306
HPV18 E1	8	513		HPV18 E2	8	59
HPV18 E1	9	438		HPV18 E2	10	59
HPV18 E1	8	588		HPV18 E2	8	128
HPV18 E1	11	588		HPV18 E2	9	128
HPV18 E1	9	293		HPV18 E2	10	128
HPV18 E1	9	523		HPV18 E2	11	128
HPV18 E1	8	75		HPV18 E2	9	4
HPV18 E1	10	75		HPV18 E2	9	258
HPV18 E1	11	75		HPV18 E2	10	258
HPV18 E1	9	616		HPV18 E2	11	222
HPV18 E1	8	446		HPV18 E2	9	342
HPV18 E1	10	446		HPV18 E2	10	342
HPV18 E1	8	288		HPV18 E2	11	342
HPV18 E1	10	288		HPV18 E2	10	307
HPV18 E1	11	288		HPV18 E2	11	279
HPV18 E1	9	419		HPV18 E2	8	158
HPV18 E1	11	419		HPV18 E2	9	71
HPV18 E1	8	329		HPV18 E2	11	71
HPV18 E1	11	329		HPV18 E2	8	27
HPV18 E2	9	73		HPV18 E2	10	27
HPV18 E2	10	73		HPV18 E2	11	27